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Controlling the Uncontrollable: Understanding the Relationships between Psychological Distress, Physical Impairment, and Acceptance among Women with Gynecological Cancer

Kirby L. Williams

Missouri State University, klw019@live.missouristate.edu

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**CONTROLLING THE UNCONTROLLABLE: UNDERSTANDING THE
RELATIONSHIPS BETWEEN PSYCHOLOGICAL DISTRESS, PHYSICAL
IMPAIRMENT, AND ACCEPTANCE AMONG WOMEN WITH
GYNECOLOGICAL CANCER**

A Masters Thesis

Presented to

The Graduate College of

Missouri State University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Science, Psychology

By

Kirby L. Williams

May 2018

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ABSTRACT

As women age, the risk for being diagnosed with any gynecological cancer increases. Despite outnumbering the number of breast cancer diagnoses in a given year, there are significantly fewer studies addressing gynecological cancers. Treatment for gynecological cancers can be incredibly debilitating, both physically and psychologically. Although previous studies have evaluated and shown a relationship between physical impairment and perceived control on psychological distress in cancer patients during treatment, none have evaluated the influence of willingness and acceptance. The present study sought to expand this theory by assessing 25 gynecological cancer participants via self-report measures. Utilizing structural equation modelling, a moderated mediation was conducted to evaluate the relationship between physical impairment and perceived control on psychological distress, with willingness and acceptance serving as the moderator for the mediation. Results, while not significant, found a favorable trend for the model and suggest that future research and expanded data collection would further indicate a strong association between the factors among women with gynecological cancers.

KEYWORDS: ovarian cancer, gynecological cancer, uterine cancer, acceptance and commitment therapy, acceptance and willingness, perceived control, physical impairment

This abstract is approved as to form and content

Ann Rost, PhD
Chairperson, Advisory Committee
Missouri State University

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Approved:

Ann Rost, PhD

Erin Buchanan, PhD

Amber Abernathy, PhD

Julie Masterson, PhD: Dean, Graduate College

In the interest of academic freedom and the principle of free speech, approval of this thesis indicates the format is acceptable and meets the academic criteria for the discipline as determined by the faculty that constitute the thesis committee. The content and views expressed in this thesis are those of the student-scholar and are not endorsed by Missouri State University, its Graduate College, or its employees.

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INTRODUCTION

Gynecological cancers as a group consist of five primary types: cervical, ovarian, uterine/endometrial, vaginal, and vulvar cancers (Centers for Disease Control and Prevention [CDC], 2018). An additional, sixth type is distinguished when cancer is found in the fallopian tubes, although this subtype is rare, accounting for only 1-2% of all gynecological cancers diagnosed (University of California San Francisco [UCSF], 2018). Regardless, each presents its own unique issues and struggles affiliated with diagnosis, treatment, and prognosis. Risk for any gynecological cancer increases as women age, with most gynecological cancers being diagnosed between the ages of 40-70 years of age (Furau, Dascau, Furau, Paiusan, Radu, & Stanescu, 2011).

While the number of gynecological cancer diagnoses is more than the number of breast cancer diagnoses in a given year, there are far more research studies addressing breast cancer than there are studies concerning gynecological cancers. While the strides of breast cancer research are not to be disregarded, this significant gap in the literature is concerning. Despite growing advancements and understandings of gynecological cancers, they still “remain underfunded and under-researched,” with disparities across demographics, such as race, socioeconomic status, and cancer type (Welch, 2017; Collins, Holcomb, Chapman-Davis, Khabele, & Farley, 2014). Additionally, in a review of the literature by Pearman (2003), it was found that gynecological cancer patients experienced lower quality of life during treatment, when compared to breast cancer patients undergoing treatment. This appeared to be due to the differences in treatment intensity, age, and a lacking social support.

Cervical Cancer

Despite the estimated 13,240 new cases of invasive cervical cancer that will be diagnosed in 2018, between 1975 and 2014, the incidence rate has declined by more than half (American Cancer Society [ACS], 2018). This decline has been attributed to a rise in screening measures, primarily through the Pap test. It is important to note, however, that this declining rate has begun to slow in more recent years. In 2018, the predicted number of deaths from cervical cancer is over 4,000. While the majority of cervical cancers are attributed to certain strains of the human papillomavirus (HPV), HPV infections are fairly common in most women and rarely develop into cancer. The five-year survival rate for cervical cancer varies depending on the cancer diagnosis, with a 92% survival rate for the 46% of those diagnosed with localized cervical cancer; and 17 to 57% for those diagnosed with distant-stage or regional disease (ACS, 2018).

Treatment also varies depending on the severity of the disease. A loop electrosurgical excision procedure (LEEP), cryotherapy, laser ablation, or conization are commonly utilized to remove abnormal tissue in precancerous cervical lesions (ACS, 2018). Along with chemotherapy, surgery and radiation are often used to treat more invasive or advanced stages.

Vaginal and Vulvar Cancers

Often discussed and addressed together, vaginal cancer and vulvar cancer only account for approximately 6 to 7% of all gynecological cancers diagnosed (Centers for Disease Control and Prevention [CDC], 2016a). While diagnosis of these cancers is rare, a history of HPV, cervical cancer, weakened immune system, and smoking can put

women at an increased risk of vaginal or vulvar cancer. It is also worth noting that the Pap test does not cover the screening of vaginal and vulvar cancers, although most physicians will screen for these cancers following an abnormal Pap test for cervical cancer. The average number of deaths for vaginal and vulvar cancers are over 4,000 and 5,000, respectively (Foundation for Women's Cancer, 2018).

To treat vulvar cancer, simple procedural surgeries, such as laser surgery or excision, are often employed to remove the abnormal tissue. More extensive surgeries, such as a vulvectomy, vulvar reconstruction, pelvic exenteration, and/or lymph node surgery, are utilized only to treat more advanced stages, along with possible chemotherapy and radiation. Similarly with treatment of vaginal cancers, laser surgery and topical treatments are utilized for early stage vaginal cancer with more invasive forms being treated with surgery, radiation, and chemotherapy. Regardless of the treatment plan, in today's medical care the efforts to sustain quality of life and sexuality are prioritized as appropriate in relation to cancer stage.

Uterine Corpus (Endometrium) Cancer

Commonly referred to as endometrial or uterine cancer, uterine corpus cancer is diagnosed when malignant cells are found in the body of the uterus, with the majority of cases found in the endometrium or lining of the uterus (CDC, 2018). It is estimated that in 2018, over 63,000 new cases of uterine cancer will be diagnosed, with the incidence rate showing a 1-3% increase per year between 2005 and 2014, making it the most commonly diagnosed gynecological cancer (ACS, 2018). The death rate for uterine cancer has also increased between 1-2% each year from 2006 to 2015, with an estimated

over 11,000 expected to die in 2018. The five-year survival rate, however, is between 62 and 84%, with most cases of uterine cancer being diagnosed in early stages due to unexpected, postmenopausal bleeding.

Treatment for uterine cancer heavily revolves around the factors of cancer stage and fertility in patients (ACS, 2018). Earlier stages of the cancer are often treated with surgery and/or radiation and chemotherapy, however for young women still desiring fertility options, progestin therapy is often utilized. Progestin therapy involves the ingestion or injection of progestin in order to shrink or eliminate cancer cells, thus saving future fertility options, although this method is often regarded as “experimental” and “risky.” More advanced stages of uterine cancer, which have spread to other lymph nodes, are typically unable to be removed by surgery and thus require extensive radiation and hormone therapies. This treatment, as is consistent with most invasive forms of gynecological cancer, involves significant physical and functional impairments, including lower limb lymphedema, general pain, fatigue, pelvic issues, and other associated issues (Hammer, Brown, Segal, Chu, & Schmitz, 2014). In a study evaluating the relationship between physical impairment and physical activity in uterine cancer survivors, those who reported higher rates of physical and functional impairments, were less likely to engage in physical activity.

Ovarian Cancer

While Ovarian cancer accounts for only three percent of all cancers diagnosed, due to the aggressive nature and insufficient methods of early detection, it is the fifth leading cause of cancer death in women (Center for Disease Control [CDC], 2016b). It

also holds the highest mortality rate amongst all gynecological cancers, despite being the second most common (Foundation for Women's Cancer, 2018). In 2018, it is estimated over 22,000 women will be diagnosed with ovarian cancer (ACS, 2018). Within the same year, over 14,000 are predicted to die from the disease. This high death rate may be attributed to the fact that the majority of women who are diagnosed with ovarian cancer are diagnosed with advanced/metastasized disease. The five-year survival rate for these advanced stages ranges from only 29 to 47% (ACS, 2018).

Treatment typically includes a debulking surgery to remove as much of the tumor as possible, followed by chemotherapy with a combination of cisplatin or carboplatin and taxane or docetaxel agents (ACS, 2016a). The goal of this procedure is to induce a disease-free remission of the cancer for as long an interval as possible (Stevinson et al., 2009). Despite the treatment, approximately 75% of women with stage III or IV disease, in which the cancer has spread to the lymph nodes and/or outside the peritoneal cavity, have a recurrence in less than two years (ACS, 2016b; Jemal et al., 2009; Markman et al., 2001 as cited in Ponto, Ellington, Mellon, & Beck, 2010). The recurrence is typically followed by a return to the chemotherapy regimen, and perhaps an interperitoneal administration of the agents, with the goal of gaining another period of remission. Typically, this process continues, along with decreasing functional daily activity and increasing side effects, such as nausea and vomiting, abdominal pain, headaches, fatigue, etc., until remission is no longer achievable and/or the patient determines they do not wish to continue with chemotherapy.

Given this difficult process, it is not surprising that previous authors have noted that the "relentless nature of the disease and treatment...suggests that adjustment to this

experience may pose significant physical and emotional challenges.” (Ponto et al., 2010, p. 357). And in fact, data supports this, with reported rates of psychological distress ranging from 23% to 33% (Norton et al., 2004; Kornblith et al., 1995). Even greater, the occurrence of clinical depression specifically, has been reported in 55% of women in treatment (Norton et al., 2004).

When evaluating the circumstances surrounding these reports, a review of the literature by Arden-Close and colleagues (2008) examining predictors of distress indicates that higher rates of depression and anxiety are often found among younger women (Strong et al., 2007), those with perceived poor social support (Stewart, Wong, Duff, Melancon, & Cheung, 2001; Norton et al., 2005), those with more advanced disease (Boscaglia et al., 2005; Kornblith et al., 1995), and those with greater physical impairment (Norton et al., 2005; Kornblith et al., 1995). The comparative strength of these variables, and how these predictors may interact with regard to distress, however, is unknown.

Physical Impairment

One predictive variable that has been evaluated is the impact of physical impairment. Physical impairment in cancer patients has been defined as the degree of difficulty in limitations in one or more daily living activities, due to the side effects of both the treatment and disease itself (Kornblith et al., 1995; Arnold, 1999). Advanced gynecological cancers and their treatments tend to have significant deleterious effects for patients. Recovery from surgical procedures, such as debulking the tumor, results in dramatic loss of abdominal and core strength, thus impacting many movements required

to complete daily activities. Chemotherapy, and the cancer itself, contribute significantly to overall weakness, cognitive decline, peripheral neuropathy or nerve damage, abdominal blockages, and ascites or fluid in the abdomen. As a result, the majority of gynecological cancer patients endorse suffering from some degree of physical impairment during their treatment.

Physical impairment has also been associated with increased rates of anxiety and depression, as well as lower self-esteem (Norton et al., 2005; Simonelli, Fowler, Maxwell, & Andersen, 2008) among patients with gynecological cancers. In fact, according to prospective studies, physical impairment is the strongest predictor of overall psychological distress throughout the course of ovarian cancer (Kornblith et al., 1995). In a study evaluating physical impairment and symptoms of depression in gynecological cancer survivors, those who reported higher physical impairment also reported “lower levels of meaning in life,” and a higher number of depressive symptoms (Simonelli et al., 2008). This indicates that as women experience increasing pain, mobility limitations, fatigue, and sickness that interferes with their ability to engage in their typical activities and to function independently in completing activities of daily living, they tend to be increasingly distressed and emotionally disturbed, no matter what stage of disease progression or overall prognosis.

Perceived Control

Alternatively, researchers have noted that individuals tend to have better psychological adjustment when they perceive that they have the ability to achieve positive and avoid negative outcomes through their own actions, also known as personal

perceived control (Thompson & Collins, 1995). The context of cancer, however, has been described as a low-control situation (Ranchor et al., 2010), thus leading to questions of the effect of perceived control when little control exists. This may easily be applied to coping with physical impairments and emotional stressors experienced while managing gynecological cancers. Despite what may be uncontrollable (the disease, side effects, etc.), a broadly defined perceived control is positively related to improved psychological outcomes among individuals with cancer (Osowiecki & Compas, 1999; Thompson, Sobolew-Shubin, Galbraith, Schwankovsky, & Cruzen, 1993)

Coinciding with this concept, a predictive and unsurprising relationship appears to exist between physical impairment, perceived control, and distress. Among patients diagnosed with breast cancer and undergoing initial treatment, researchers identified a linear relationship showing that as patients recover from breast cancer surgery, their levels of perceived control increased, as their reported distress decreased (Barez, Blasco, Fernandex-Castro, & Viladrich, 2009). This suggests that as patients recover and their impairment decreases, they feel more in control and thus less distressed. For patients who do not regain a sense of control, the physical impairment appears to negatively impact their emotional state, and distress continues to increase (Ranchor et al., 2010). While this trajectory may occur among women being treated for breast cancer, the recovery trajectory is likely different for women being treated for gynecological cancers. Empirical study of the relationship among these variables (impairment, perceived control, and distress) among ovarian patients specifically, previously revealed a mediation, such that the direct relationship between impairment and distress, was mediated by the patient's

perceived control (Norton et al., 2005). Figure 1 provides a visual example of this mediation as reported by Norton et al. (2005).

Willingness and Acceptance

Given the limited control affiliated with a cancer diagnosis and treatment journey, an alternative to perceived control and the need for control is an open willingness and acceptance stance. The theory and foundation of Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999) posits that perceived control, and the perceived need for control, is a major contributor to the development of psychological distress across a variety of settings and populations (Gundy, Woidneck, Pratt, Christian, & Twohig, 2011).

Research has repeatedly shown that individuals experiencing cancer who cope through acceptance have better psychological adjustment and less distress as compared to those who cope through cognitive and behavioral control attempts (Low, Stanton, Thompson, Kwan, & Ganz, 2006). For example, women with breast cancer who score higher on measures of acceptance have less emotional distress than those who are less accepting (Stanton, Danoff-Burg, & Huggins, 2002). This is a robust finding that is consistent in cross sectional measures and prospective measures (Stanton & Snider, 1993). This finding has also been echoed in similar studies evaluating women undergoing treatment for a gynecological cancer, in which those who utilized greater acceptance and positivity techniques reported better functional and emotional well-being over time, especially when compared to those who utilized avoidant coping strategies and denial (Lutgendorf et al., 2002; Gould, Brown, & Bramwell, 2010). Similarly,

psychological interventions that target acceptance are associated with improved psychological outcomes among women coping with advanced cancer (Rost et al., 2012).

Within the ACT model, acceptance does not represent a resolve or ‘giving up,’ but rather a willingness to have, be, and experience what is, while continuing to strive for health and quality of life. This is often in opposition to the desire and effort that may be exerted to control one’s reactions, feelings, and emotions in regards to what is present and their current experience. When evaluating coping strategies in women during treatment for gynecological cancer, those who had higher physical impairment and complications during treatment, led to lower satisfaction and the increased utilization of a helplessness-hopelessness coping tactic (Bucholc, Kucharczyk, Kanadys, Wiktor, & Wiktor, 2016). Thus, showing that the higher the physical impairment, the higher lack of perceived control over treatment, the lower satisfaction and ability to cope by more effective, positive means.

Hypotheses

Given this model and the empirical support of this model, we suggest that it is not just perceived control that is an important mediator, but that a patient’s acceptance and willingness plays an important role in better understanding the relationships between physical impairment, perceived control and psychological distress. The purpose of the current study is to build on the previously presented model and examine the interplay of these variables using a cross sectional design, with data obtained from women who have been diagnosed with a gynecological cancer.

Specifically, the intent is to test a hypothesized model in which willingness functions as a moderated mediator in the previously reported model, in which perceived control mediated the effect between physical impairment and psychological distress. It is expected that for patients with high physical impairment, who are emotionally and psychologically willing to experience the current impairment, perceived control will make less of a contribution in determining psychological distress.

METHODS

Participants

In total, 25 women completed the study's questionnaires via self-report. Of the participants, 15 were diagnosed with ovarian cancer, 6 were diagnosed with endometrial cancer, and 4 were diagnosed with uterine cancer. The majority of participants were currently undergoing some form of treatment, such as chemotherapy, radiation, surgery, or hormone therapy. 6 participants were in the remission stage of the disease, while the remaining participants were diagnosed with a range from Stages I-IV. The number of days since diagnosis, at the time of completing the survey, ranged from 40-3536 days (approximately 9 years and 8 months), with an average of 1241 days (approximately 3 years and 4 months).

Participant age ranged from 31-76 with an average age of 50.76 years. The average level of education received was a college degree, while the average household income was \$84,273. 19 of the participants identified as being married, 3 identified as being divorced, and 3 identified as single. The majority of participants identified as Caucasian/White, while 2 identified as Latino. Table 1 comprehensively presents demographic and medical data collected.

Procedure

Approval from the Missouri State University IRB was obtained prior to participant recruitment (IRB-FY2018-309; Appendix A). Participants were recruited through online support groups for those diagnosed with gynecological cancer. Group

administrators were contacted with information regarding the study, a digital flyer, and a URL link to the study questionnaires. Of those contacted, 25 women participated ($N = 25$). The inclusion criteria were: (a) primary diagnosis of a gynecological cancer, Stages I-IV or In Remission, (b) the patient is undergoing or has undergone treatment for gynecological cancer, (c) the patient is at least 18 years of age or older, and (d) the patient is proficient in English language reading and writing. All participants were asked to provide consent before being able to proceed to the survey questionnaires.

Measures

Demographics. Information regarding demographics included the patient's age, date of diagnosis, cancer stage, treatment stage, race/ethnicity, education level, marital status, employment status, and average household income (See Appendix B).

Psychological Distress. Psychological distress was measured by assessing depression and anxiety related symptoms. Depression related symptoms were evaluated using the Center for Epidemiologic Studies Depression Scale (*CES-D* $\alpha = .85-.90$; Radloff, 1977; See Appendix B). Anxiety related symptoms were evaluated using the Generalized Anxiety Disorder 7-item scale (*GAD-7* $\alpha = .89$; Spitzer, Kroenke, Williams, & Lowe (2006); Lowe et al., 2008; See Appendix B). Participants answered the 20-question and 7-question, respectively, assessments, with higher scores corresponding to higher severity. Both scales utilized a 0-3 ranking system and corresponded accordingly. Scores from each were combined to create a total psychological distress score.

Physical Impairment. In order to evaluate patients' ability to perform daily activities and the degree of difficulty performing daily tasks, the Cancer Rehabilitation

Evaluation System Short Form for Research (*CARES-SF* $\alpha = .70$; Coscarelli & Heinrich, 1988) was used (See Appendix B). The first 10 items of the CARE-SF, which pertain to physical impairment, were utilized for data analysis purposes to assess the identified variable. High scores related to higher impairment

Perceived Control. Consistent with previous studies evaluating perceived control (Thompson et al., 1993; Norton et al., 2005), participants were asked to rate their perception of control over the following items: emotions, physical symptoms, medical treatment, medical information, progression of disease, physical activity, and overall. Participants answered the question “To what extent do you feel that you have control over...?”, followed by the listing of the above mentioned items (See Appendix B). The corresponding scale included 4 points ranging from 1 (no control at all), 2 (very little control), 3(some control), to 4 (a great deal of control).

Willingness and Acceptance. The factors associated with the ACT principles of willingness and acceptance were evaluated through the Acceptance & Action Questionnaire (*AAQ-II* $\alpha = .91$; Hayes et al., 2004; See Appendix B). The traditional 7-item scale questions were utilized for this particular analysis, although an additional 3 reverse score items from the 10-item *AAQ-2* were collected. The measure utilizes a 7-point scale, with higher scores indicating “greater levels of psychological inflexibility (Bond et al., 2011).” For the purpose of interpretation of statistical analyses, this suggests that lower *AAQ-2* scores indicate lesser influence of external variables over time, thereby indicating more willingness and acceptance.

RESULTS

Preliminary Analysis

Prior to analysis, data screening confirmed that the data was accurate. 2 participants were revealed to be missing 2 values for the *CES-D* questionnaire each, and thus, following the less than 5% standard for replacement, these values were replaced using linear trend at point. When taking into consideration the number of participants included in the study ($N = 25$), the data met all assumptions for normality, multicollinearity, homogeneity, and homoscedasticity. No multivariate outliers were found. Table 2 presents a summary of the means for the variables of concern, physical impairment, perceived control, psychological distress, and willingness and acceptance. All analyses were completed using *R-stats* statistics program.

Analysis of Cancer-Related Variables

In order to evaluate the relationship between the disease-related variables of cancer type, stage, and treatment, on primary variables of concern for this project, psychological distress, physical impairment, willingness and acceptance, and perceived control, 12 one-way between subjects ANOVAs were analyzed. Psychological distress did not reveal significant relationships for cancer type ($F(2,22) = 0.96, p = .40, \eta^2 = .08$), stage ($F(4,20) = 0.92, p = .47, \eta^2 = .16$), or treatment phase ($F(4,20) = 0.25, p = .90, \eta^2 = .05$). The willingness and acceptance variable also did not reveal significant relationships for cancer type ($F(2,22) = 1.01, p = .38, \eta^2 = .08$), stage ($F(4,20) = 0.14, p = .96, \eta^2 = .03$), or treatment phase ($F(4,20) = 2.75, p = .06, \eta^2 = .35$). Additionally, perceived

control did not yield significant relationships for cancer type ($F(2,22) = 0.50, p = .61, \eta^2 = .04$), stage ($F(4,20) = 1.31, p = .29, \eta^2 = .21$), or treatment phase ($F(4,20) = 1.77, p = .17, \eta^2 = .26$). A lack of significance is believed to be attributed to low N .

Physical impairment did not yield significant results for the relationship with cancer type ($F(2,22) = 0.15, p = .86, \eta^2 = .01$), or treatment ($F(4,20) = 0.43, p = .78, \eta^2 = .08$). The relationship between physical impairment and cancer stage, however, did indicate a significant relationship ($F(4,20) = 3.86, p = .01, \eta^2 = .44$). Post-hoc analyses using independent t -tests with Bonferroni correction was used to examine differences between individual groups and revealed significant differences between the Stage II ($M = 17, SD = 5.29$) and Stage IV ($M = 32.33, SD = 5.86$), $t(4) = -3.36, p = 0.03, d = -2.75$, 95%CI[-5.12 - -0.25] groups and between the groups of Stage IV ($M = 32.33, SD = 5.86$) and remission ($M = 19.67, SD = 5.13$), $t(7) = -3.35, p = 0.04, d = -2.37$, 95%CI[-4.16 - -0.48]. This indicates that Stage IV entails significantly more physical impairment when compared to participants with Stage II cancer or participants in remission.

Perceived Control as a Mediator Between Physical Impairment and Psychological Distress

Drawing on the Norton et al., (2005) study as a model for this study, the same analysis of the relationship between physical impairment and distress, utilizing perceived control as a mediator, was analyzed for this study. Figure 2 illustrates the visual representation of the completed model for the current study. Analysis of the predictability of physical impairment on psychological distress (the c pathway), revealed a positive relationship between the two variables, $b = 0.46, t(23) = 1.18, p = .25$. The

ability of physical impairment to predict perceived control (the *a* path) showed a negative relationship between the variables, $b = -0.21$, $t(23) = -2.13$, $p = .002$. Thus, as physical impairment increases, perceived control decreases. Finally, the relationship between the mediator of perceived control and the variable of psychological distress indicated a significant, negative relationship, $b = -2.50$, $t(23) = -4.09$, $p < .001$. This indicates that as perceived control decreases, psychological distress increases. While the sample size limits the interpretation of the results, given that the Sobel test ($Z = 1.42$, $p = .16$), and Confidence Interval calculations of path effects (total effect = .62; direct effect = -.09; indirect effect = .54) were nonsignificant, the analysis does show a desired general trend in the hypothesized direction. Given that the value of the indirect effect would indicate a strong mediation, confidence intervals were calculated for the indirect effect using bootstrapping ($R = 1000$), 95% CI [-0.12, 1.14]. By comparison to the model's other pathways, analysis suggested that perceived control as a mediator for physical impairment yielded a strong, inverse relationship to the *y*-value of psychological distress. Thus, as physical impairment increases, perceived control decreases, and psychological distress increases, and vice versa. Statistical summaries for all mediation pathways of the variables is included in Table 3.

Willingness and Acceptance as a Moderator for the Mediation between Physical Impairment, Perceived Control, and Psychological Distress

To address the primary focus of the study, the associations between physical impairment, perceived control, and psychological distress, with willingness and acceptance serving as a moderator for the mediation was analyzed. Figure 3 illustrates

the visual representation of the completed model. Again, while the sample size limits the interpretation, the trend of the analysis is promising. The overall model's interaction was not found to be significant, $F(4, 20) = 5.17, p = .005, R^2 = .51$. Output for the not significant relationship between physical impairment and psychological distress (the c pathway) and the significant relationship between physical impairment and perceived control (the a path) were consistent with the previous mediation analysis. These relationships suggest that as physical impairment increases, psychological distress increases and, separately, that as physical impairment increases, perceived control decreases. The relationship between the variables of perceived control and psychological distress was found to be significant, $b = -1.93, t(20) = -2.56, p = .02$. Thus, as perceived control increases, psychological distress decreases. While the c' pathway was not significant, the inclusion of the mediator (perceived control) and moderator (willingness and acceptance) variables did affect the relationship from positive to negative, $b = -0.15, t(20) = -0.44, p = .66$, indicating that the moderator has an inverse effect. Analysis of the variable of willingness and acceptance as a moderator for the mediation did not yield a significant result, $b = 0.35, t(20) = 1.28, p = .21$, but suggested that as psychological inflexibility increases, psychological distress increases as well. Simple slopes were calculated only to determine the indirect effects of the moderator (W) which resulted in changes at varying levels, further indicating that the interaction was not significant due to a low N . Thus, as the moderator, *AAQ-2* scores, increases, the relationship between the mediator of perceived control and the variable of psychological distress decreases in strength. Confidence Intervals for the indirect effects were calculated using bootstrapping ($R = 1000$). Indirect effect size for average willingness and acceptance

scores was 0.41, 95% CI [-0.11, 1.14]. Low scores, indicating greater willingness and acceptance, indirect effect was estimated as 0.50, 95% CI [-0.11, 1.09], and high scores, indicating lower willingness and acceptance, had an estimated indirect effect of 0.31, 95% CI [-0.32, 0.90].

DISCUSSION

Summary

Despite statistical analysis of the data showing a general lack of significance in the studied relationship, the general trend of the data did indicate some support to the hypothesized model. Overall, this study indicated a relationship between the variables of physical impairment and psychological distress, physical impairment's and perceived control's impact over psychological distress, and a relationship between willingness and acceptance in addition to physical impairment and perceived control over psychological distress. These findings provide further support to the literature and present newer findings to be further explored when expanding the knowledge of gynecological cancers. This study was also able to provide insight regarding cancer-related variables, such as cancer type and stage, in relation to the measured variables. Thus, these findings provide insight into the relationship between the variables and the support for future, more thorough analyses to be conducted.

Data Limitations

It is important, however, to note the limitations involved with this study. First and foremost, the small number of participants does not allow for the analysis to be thoroughly vetted in order to determine a more appropriate significance value for the relationship. Thus, this analysis can, at best, be categorized as an exploratory study to support future, more expansive research on the relationship. Expanding the study's reach is crucial to a more thorough analysis of the relationship, but it may also be ideal to

conduct this study in more targeted, local areas in order to gain access to better follow-up. Formal introduction and exit interviews may need to be utilized, when applicable, to gain a better assessment of the impact of the study.

Additionally, while the identified factors, variables, and measures for this analysis were the focus of this particular hypothesized model, there were other variables and measures collected that have not yet been analyzed. Future analysis regarding personality, mood, and other potential factors' impact on the ability to cope with gynecological cancers may provide further insight into the relationship. Reviews of the current literature and these factors would also need to be conducted.

Proposed Future Application

Practical application for these findings would point toward possible areas of focus during treatment in order to alleviate some psychological distress in gynecological cancer patients. Physical activity often changes during the course of cancer treatment, and specifically among women undergoing the difficult treatment of surgery and adjuvant treatment for gynecological cancer. Data suggests that in the first year following the diagnosis, almost 40% of women with ovarian cancer decrease their level of physical activity (Beesley et al., 2011). This is problematic, given that physical activity has been shown to be related to better psychological outcomes and coping among individuals undergoing treatment for cancer (Faul et al., 2011), as well as less physical impairment (Ligibel et al., 2010; Wu, Dodd, & Cho, 2008). Alternatively, decreased physical activity is often associated with more reports of depression and decreased quality of life (Beesley et al., 2011).

Despite the fact that implementing physical activity interventions is complicated with individuals with illness, 84% of patients with metastatic breast cancer have reported that they would be interested in an exercise program that could be done in their home (Lowe, Watanabe, Baracos, & Courneya, 2010). Among ovarian cancer patients, 53% reported that they would be interested in participating in a physical activity program (Stevinson et al., 2009). In both cases, the women endorsed preference toward light impact activity, such as walking, and to be in a small group with people they knew (Lowe et al., 2010; Stevinson et al., 2009). Although intervention studies have not been conducted with gynecological cancer patients, research conducted with patients diagnosed with advanced metastatic breast cancer indicate that interventions that lead to increased physical activity produce improved physical functioning and decrease fatigue (Oldervoll et al., 2006; Headley, Ownby, & John, 2004). These studies further suggest that even light physical activity has the capacity to slow the development of physical impairment that is experienced by these patients.

Past research has largely focused on the role of self-efficacy, as opposed to perceived control, when considering variables from the Health Benefit Model in relation to physical activity. The Health Belief Model (Hochbaum, 1958) provides explanation and prediction for health-related behaviors. This model demonstrates that an individual's self-efficacy, perceived threat or susceptibility, perceived benefits versus perceived barriers, and cues to action will influence the likelihood to engage in health-related behaviors. These factors, however, typically address behaviors affiliated with pre-screening or preventative steps, thus increasing the perception of control. In relation to

our model, we believe increased activity would impact perceived control of an uncontrollable situation, which appears to be associated with less distress.

Future research may evaluate this relationship within our proposed model, by incorporating physical activity during cancer treatment. Yoga, a commonly recommended form of light impact physical activity, has been evaluated extensively in various populations of chronic illness and cancer, but not in gynecological cancers (Bosch, Traustadottir, Howard, & Matt, 2009; Rogers & Macdonald, 2015; Fouladbakhsh, Davis, & Yarandi, 2014; Buffart et al., 2012; Duncan, Leis, & Taylor-Brown, 2008; Danhauer et al., 2009; Danhauer et al., 2008; Lowe, Watanabe, Baracos, & Courneya, 2012; Smith & Pukall, 2009; Levine & Balk, 2012). Additionally, the impact of healthier lifestyle choices, including better diet and regular physical activity, has also been linked to help reduce the rate of telomere shortening in the overall population, as well as during treatment for cancer patients (Garland et al., 2014a; Garland et al., 2014b; Shamma, 2011). Telomeres are the genetic material located at the ends of chromosomes in order to protect the genetic data in cells as they divide (Shamma, 2011). As humans age, telomeres shorten, which increases the risk of developing cancer (Wong & Collins, 2003). This is all referenced to show that there are many working parts to this theory and study. The need for future research in these areas and within this model is imperative as the field moves forward with understanding and assisting gynecological cancer patients as they cope and in order to increase patients' overall quality of life.

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APPENDICES

Appendix A. Human Subjects IRB Approval



To:
Ann Rost
Psychology
Erin Buchanan, Amber Abernathy

RE: Notice of IRB Approval

Submission Type: Initial

Study #: IRB-FY2018-309

Study Title: Controlling the Uncontrollable: Understanding the Relationships between Psychological Distress, Physical Impairment, and Acceptance among Women with Gynecological Cancer

Decision: Approved

Approval Date: Jan 3, 2018

Expiration Date: Jan 2, 2019

This submission has been approved by the Missouri State University Institutional Review Board (IRB) for the period indicated.

Federal regulations require that all research be reviewed at least annually. It is the Principal Investigator's responsibility to submit for renewal and obtain approval before the expiration date. You may not continue any research activity beyond the expiration date without IRB approval. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.

You are required to obtain IRB approval for any changes to any aspect of this study before they can be implemented. Should any adverse event or unanticipated problem involving risks to subjects or others occur it must be reported immediately to the IRB.

This study was reviewed in accordance with federal regulations governing human subjects research, including those found at 45 CFR 46 (Common Rule), 45 CFR 164 (HIPAA), 21 CFR 50 & 56 (FDA), and 40 CFR 26 (EPA), where applicable.

Researchers Associated with this Project:

PI: Ann Rost

Co-PI: Erin Buchanan, Amber Abernathy

Primary Contact: Kirby Williams

Other Investigators:

Appendix B. Measures

Appendix B-1 Demographic Information

Participant No.: _____

Age: _____

Race/Ethnicity:

Caucasian/White	African American/Black	Asian/Pacific
Islander		
Hispanic or Latino	Native American or American Indian	Other: __

Education level:

Less than High School	High school graduate	Some College	College
Graduate			
Graduate School			

Marital Status:

Single	Married	Divorced/Separated	Other: _____

Average Household Income: _____

Date of Diagnosis: _____

Disease Stage:

Stage I	Stage II	Stage III	Stage IV	Recurrent disease
Remission				

Treatment Stage:

Pre-surgery	Post-surgery	Chemotherapy	Radiation
Treatment			
No Current Treatment	Other: _____		

Appendix B-2 Center for Epidemiologic Studies Depression Scale (CES-D)

Center for Epidemiologic Studies Depression Scale (CES-D)

Date: _____

Below is a list of some of the ways you may have felt or behaved. Please indicate how often you've felt this way during the **past week**. Respond to all items.

Place a check mark (✓) in the appropriate column. During the past week...	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	All of the time (5-7 days)
1. I was bothered by things that usually don't bother me.				
2. I did not feel like eating; my appetite was poor.				
3. I felt that I could not shake off the blues even with help from my family.				
4. I felt that I was just as good as other people.				
5. I had trouble keeping my mind on what I was doing.				
6. I felt depressed.				
7. I felt that everything I did was an effort.				
8. I felt hopeful about the future.				
9. I thought my life had been a failure.				
10. I felt fearful.				
11. My sleep was restless.				
12. I was happy.				
13. I talked less than usual.				
14. I felt lonely.				
15. People were unfriendly.				
16. I enjoyed life.				
17. I had crying spells.				
18. I felt sad.				
19. I felt that people disliked me.				
20. I could not "get going."				

Scoring for Center for Epidemiologic Studies Depression Scale (CES-D)

Directions: Do not score if missing more than 4 responses. 1) For each item, look up your response and corresponding score (0-3). 2) Fill in the score for each item under the last column labeled "Score." 3) Calculate your Total Score by adding up all 20 scores.

During the past week...	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	All of the time (5-7 days)	Score
1. I was bothered by things that usually don't bother me.	0	1	2	3	
2. I did not feel like eating; my appetite was poor.	0	1	2	3	
3. I felt that I could not shake off the blues even with help from my family.	0	1	2	3	
4. I felt that I was just as good as other people.	3	2	1	0	
5. I had trouble keeping my mind on what I was doing.	0	1	2	3	
6. I felt depressed.	0	1	2	3	
7. I felt that everything I did was an effort.	0	1	2	3	
8. I felt hopeful about the future.	3	2	1	0	
9. I thought my life had been a failure.	0	1	2	3	
10. I felt fearful.	0	1	2	3	
11. My sleep was restless.	0	1	2	3	
12. I was happy.	3	2	1	0	
13. I talked less than usual.	0	1	2	3	
14. I felt lonely.	0	1	2	3	
15. People were unfriendly.	0	1	2	3	
16. I enjoyed life.	3	2	1	0	
17. I had crying spells.	0	1	2	3	
18. I felt sad.	0	1	2	3	
19. I felt that people disliked me.	0	1	2	3	
20. I could not "get going."	0	1	2	3	
Total Score:					

Appendix B-3 Generalized Anxiety Disorder (GAD-7) Scale.

Generalized Anxiety Disorder 7-item (GAD-7) scale

Over the last 2 weeks, how often have you been bothered by the following problems?	Not at all sure	Several days	Over half the days	Nearly every day
1. Feeling nervous, anxious, or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it's hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3
<i>Add the score for each column</i>	+	+	+	
Total Score (<i>add your column scores</i>) =				

If you checked off any problems, how difficult have these made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all _____
Somewhat difficult _____
Very difficult _____
Extremely difficult _____

Appendix B-4 Cancer Rehabilitation Evaluation System Short Form (CARE-SF).

CARES-SF
Cancer Rehabilitation Evaluation System
Short Form

Patient Information

Name: _____

Date: _____

Age: _____

Sex: M F

Type of Cancer: _____

Date of Diagnosis: _____

Instructions

Below is a list of Problem Statements that describe situations and experiences of individuals who have or have had cancer. Read each statement and circle the number that best describes **HOW MUCH EACH STATEMENT APPLIES TO YOU** during the **PAST MONTH, INCLUDING TODAY**. Some sections will not apply to you. Please skip these sections and proceed to the next one as directed. For any problem statement that you rate between 1 and 4, indicate whether this is a problem with which you would like help by circling Y for yes or N for no.

Example

How much does it apply to you?	Not at all A little A fair amount Much Very much	Do you want help?
1. I have difficulty walking	0 ① 2 3 4	Y ① N
2. I find that food tastes bad	0 1 2 3 ④	④ Y N

How much does it apply to you?	Not at all	A little	A fair amount	Much	Very much	Do you want help?
1. I have difficulty bending or lifting	0	1	2	3	4	Y N
2. I do not have the energy I used to	0	1	2	3	4	Y N
3. I have difficulty doing household chores	0	1	2	3	4	Y N
4. I have difficulty bathing, brushing my teeth, or grooming myself	0	1	2	3	4	Y N
5. I have difficulty planning activities because of the cancer or its treatments	0	1	2	3	4	Y N
6. I cannot gain weight	0	1	2	3	4	Y N
7. I find food unappealing	0	1	2	3	4	Y N
8. I find that cancer or its treatments interfere with my ability to work	0	1	2	3	4	Y N
9. I frequently have pain	0	1	2	3	4	Y N
10. I find that my clothes do not fit	0	1	2	3	4	Y N
11. I find that doctors don't explain what they are doing to me	0	1	2	3	4	Y N
12. I have difficulty asking doctors questions	0	1	2	3	4	Y N
13. I have difficulty understanding what the doctors tell me about the cancer or its treatments	0	1	2	3	4	Y N
14. I would like to have more control over what the doctors do to me	0	1	2	3	4	Y N
15. I am uncomfortable with the changes in my body	0	1	2	3	4	Y N
16. I frequently feel anxious	0	1	2	3	4	Y N
17. I have difficulty sleeping	0	1	2	3	4	Y N
18. I have difficulty concentrating	0	1	2	3	4	Y N
19. I have difficulty asking friends or relatives to do things for me	0	1	2	3	4	Y N
20. I have difficulty telling my friends or relatives about the cancer	0	1	2	3	4	Y N

How much does it apply to you?	Not at all A little A fair amount Much Very much	Do you want help?
21. I find that my friends or relatives tell me I'm looking well when I'm not.....0 1 2 3 4		Y N
22. I find that my friends or relatives do not visit often enough0 1 2 3 4		Y N
23. I find that friends or relatives have difficulty talking with me about my illness0 1 2 3 4		Y N
24. I become nervous when I am waiting to see the doctor0 1 2 3 4		Y N
25. I become nervous when I get my blood drawn0 1 2 3 4		Y N
26. I worry about whether the cancer is progressing0 1 2 3 4		Y N
27. I worry about not being able to care for myself0 1 2 3 4		Y N
28. I do not feel sexually attractive0 1 2 3 4		Y N
29. I am not interested in having sex0 1 2 3 4		Y N
30. I sometimes don't follow my doctor's instructions0 1 2 3 4		Y N
31. I have financial problems0 1 2 3 4		Y N
32. I have insurance problems0 1 2 3 4		Y N
33. I have difficulty with transportation to and from my medical appointments and/or other places0 1 2 3 4		Y N
34. I am gaining too much weight0 1 2 3 4		Y N
35. I have frequent episodes of diarrhea0 1 2 3 4		Y N
36. I have times when I do not have control of my bladder0 1 2 3 4		Y N
Do you have children? Yes No <i>If No, skip to next section.</i>		
37. I have difficulty helping my children cope with my illness0 1 2 3 4		Y N

How much does it apply to you?		Not at all A little A fair amount Much Very much					Do you want help?
Are you working or have you been employed during the last month?		Yes No					
<i>If No, skip to next section.</i>							
38.	I have difficulty talking to the people who work with me about the cancer	0	1	2	3	4	Y N
39.	I have difficulty asking for time off from work for medical treatments	0	1	2	3	4	Y N
40.	I am worried about being fired	0	1	2	3	4	Y N
Did you look for work during the past month?		Yes No					
<i>If No, skip to next section.</i>							
41.	I have difficulty finding a new job since I have had cancer	0	1	2	3	4	Y N
Have you attempted sexual intercourse since your cancer diagnosis?		Yes No					
<i>If No, skip to next section.</i>							
42.	I find that the frequency of sexual intercourse has decreased	0	1	2	3	4	Y N
Are you married or in a significant relationship?		Yes No					
<i>If No, skip to next section.</i>							
43.	My partner and I have difficulty talking about our feelings	0	1	2	3	4	Y N
44.	My partner and I have difficulty talking about wills and financial arrangements	0	1	2	3	4	Y N
45.	I do not feel like embracing, kissing, or caressing my partner	0	1	2	3	4	Y N
46.	My partner and I are not getting along as well as we usually do	0	1	2	3	4	Y N
47.	My partner spends too much time taking care of me	0	1	2	3	4	Y N

How much does it apply to you?		Not at all A little A fair amount Much Very much				
48.	I have difficulty asking my partner to take care of me	0	1	2	3	4
Are you single and not in a significant relationship?		Yes No				
If No, skip to next section.						
49.	I have difficulty initiating contact with potential dates	0	1	2	3	4
50.	I have difficulty telling a date about the cancer or its treatments	0	1	2	3	4
Have you had chemotherapy treatments in the last month?		Yes No				
If No, skip to next section.						
51.	I become nervous when I get chemotherapy	0	1	2	3	4
52.	I become nauseated during and/or before chemotherapy	0	1	2	3	4
53.	I feel nauseated after I receive chemotherapy	0	1	2	3	4
54.	I vomit after chemotherapy	0	1	2	3	4
55.	I have other side effects after chemotherapy	0	1	2	3	4
Have you had radiation therapy treatments in the last month?		Yes No				
If No, skip to next section.						
56.	I get nervous when I get radiation treatments	0	1	2	3	4
57.	I feel nauseous or vomit after my radiation treatments	0	1	2	3	4
Do you have an ostomy?		Yes No				
If No, skip to next section.						
58.	I have problems with ostomy care and maintenance	0	1	2	3	4

How much does it apply to you?

Not at all
A little
A fair amount
Much
Very much

Do you have a prosthesis?

Yes No

If No, skip to next section.

59. I have difficulty with my prosthetic device (artificial limb, breast prosthesis, etc.)..... 0 1 2 3 4

Appendix B-5 Perceived Control Questionnaire

Please rate the following:

To what extent do you feel that you have control over...

	No control at all	Very little control	Some Control	A great deal of control
Your Emotions?	1	2	3	4
Physical Symptoms?	1	2	3	4
Medical Treatment?	1	2	3	4
Medical Information?	1	2	3	4
Progress of your cancer?	1	2	3	4
Physical Activity?	1	2	3	4
Overall?	1	2	3	4

Appendix B-6 Acceptance & Action Questionnaire (AAQ-2)

7

AAQ-2

Below you will find a list of statements. Please rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice.

1	2	3	4	5	6	7					
never true	very seldom true	seldom true	sometimes true	frequently true	almost always true	always true					
1.	It's OK if I remember something unpleasant.				1	2	3	4	5	6	7
2.	My painful experiences and memories make it difficult for me to live a life that I would value.				1	2	3	4	5	6	7
3.	I'm afraid of my feelings.				1	2	3	4	5	6	7
4.	I worry about not being able to control my worries and feelings.				1	2	3	4	5	6	7
5.	My painful memories prevent me from having a fulfilling life.				1	2	3	4	5	6	7
6.	I am in control of my life.				1	2	3	4	5	6	7
7.	Emotions cause problems in my life.				1	2	3	4	5	6	7
8.	It seems like most people are handling their lives better than I am.				1	2	3	4	5	6	7
9.	Worries get in the way of my success.				1	2	3	4	5	6	7
10.	My thoughts and feelings do not get in the way of how I want to live my life.				1	2	3	4	5	6	7

Revised date (4 October 2006)

TABLES

Table 1. Demographic Data Summaries

Descriptive Statistics of Participant Demographic Data			
Variable	<i>N</i>	<i>M</i>	Variance
Age	21	50.76	31-76
Race	25		
Caucasian/White	23		
Hispanic/Latino	2		
Education	25		
High School Graduate	2		
Some College	7		
Two-Year College Degree	4		
Four-Year College Degree	7		
Professional Degree	5		
Marital Status	25		
Married	19		
Divorced	3		
Single	3		
Average Household Income	22	84273	24000-300000
Primary Cancer Diagnosis	25		
Ovarian	16		
Uterine	4		
Endometrium	6		
Disease Stage	25		
Stage I	5		
Stage II	3		
Stage III	8		
Stage IV	3		
Remission	6		
Treatment Stage	25		
Chemotherapy	4		
Post-surgery	5		
Radiation	1		
No Current Treatment	5		
Other	9		
Days Since Diagnosis*	25	1241	40-3536

*From date of survey completion

Table 2. Table of Means for the Studied Variables.

Descriptive Statistics of the Variables		
Variable	<i>M</i>	<i>SD</i>
Physical Impairment	23.16	6.61
Perceived Control	19.56	3.50
Psychological Distress	32.84	12.56
Willingness and Acceptance	22.6	9.17

Table 3. Model Summaries for Mediation Analysis.

Mediation Model Summaries			
Model	<i>F</i>	<i>p</i>	<i>R</i> ²
Physical Impairment predicting Psychological Distress	(1, 23) = 1.40	.25	.06
Physical Impairment predicting Perceived Control	(1, 23) = 4.52	.04	.16
Physical Impairment and Perceived Control predicting Psychological Distress	(1, 22) = 9.52	.001	.46

FIGURES

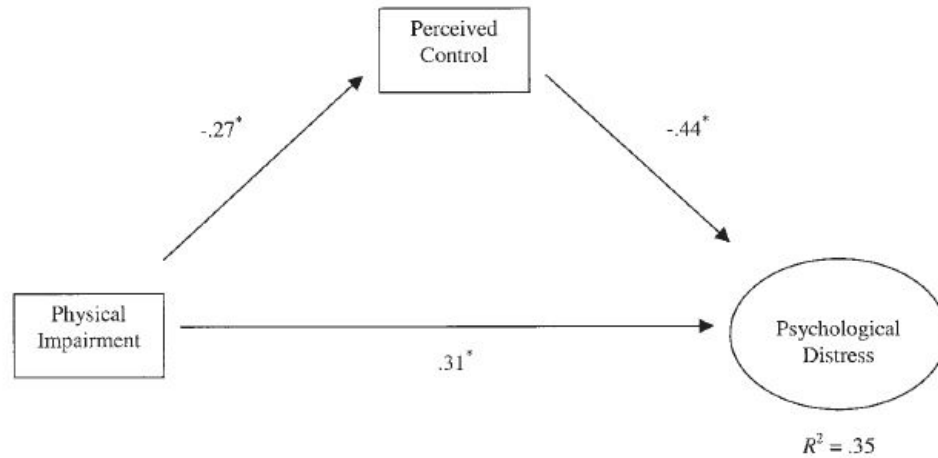


Figure 1. Model of the Mediation Analysis from Norton et al. (2005).

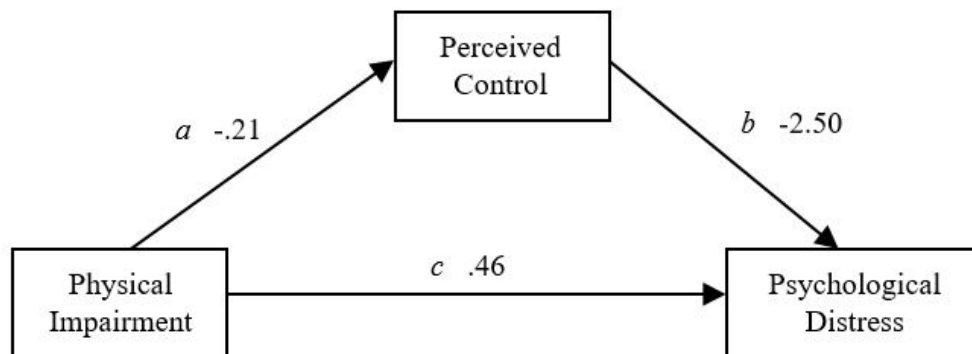


Figure 2. Completed Model of the Mediation. The figure illustrates the completed model for the current study, showing the relationship between physical impairment and psychological distress (c pathway; $b = .46$). The relationship between physical impairment and perceived control as the mediator (a pathway; $b = -.21$) and the relationship between perceived control and psychological distress (b pathway; $b = -1.93$).

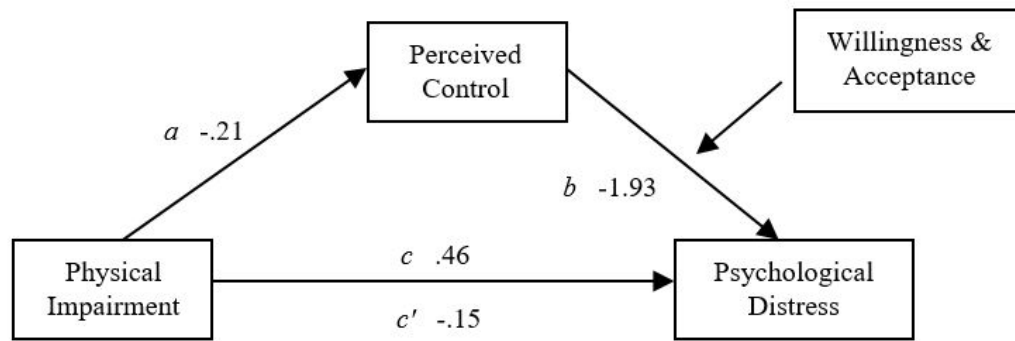


Figure 3. Completed Model of the Moderated Mediation. The model illustrates the relationship between physical impairment and psychological distress, with (c pathway; $b = .46$) and without (c' pathway; $b = -.15$) the moderator. The relationship between physical impairment and perceived control as the mediator (a pathway; $b = -.21$) while willingness and acceptance serves as a moderator (b pathway; $b = -1.93$).