

ABSTRACT

Title of dissertation: EVALUATING THE MODERATING EFFECTS OF SOCIAL CONSTRAINTS AND EMOTIONAL APPROACH COPING IN A RANDOMIZED CONTROLLED TRIAL OF EXPRESSIVE WRITING WITH OVARIAN CANCER PATIENTS

Ana Vladimirova Popovska, Doctor of Philosophy, 2016

Dissertation directed by: Professor Mary Ann Hoffman
Department of Counseling, Higher Education, and Special Education

A randomized controlled experiment was conducted to investigate the effects of expressive writing and fact-control writing about experiences with ovarian cancer on emotional well-being and quality of life one month after writing in women diagnosed with ovarian cancer. Moderation effects of emotional approach coping and social constraints were predicted based on a matching hypothesis for the fit between the demands of writing and individual differences (Niles et al, 2014) and the role of social constraints on disclosure (Lepore & Revenson, 2007). Cancer-related avoidance and cancer-related intrusive thoughts were examined as mediators on the relationships

between social constraints and emotional well-being at follow up and social constraints and quality of life at follow up. Results showed that participants in the expressive writing condition reported increased emotional well-being at follow up, controlling for baseline levels of emotional well-being, but there were no differences in quality of life at follow up between the two writing conditions, controlling for baseline quality of life. There were no differences in reported average negative affect post writing sessions between the two writing conditions. In a model predicting emotional well-being at follow up, expressive writing had a positive effect, social constraints had a negative effect, and emotional approach coping had no effect. The hypothesized moderation effects between emotional approach coping, social constraints and writing condition in predicting emotional well-being at follow up were not detected and support for the matching hypothesis proposed by Niles et al (2014) was not found. In a marginally significant model, social constraints had a significant effect and interacted with writing condition to predict quality of life at follow up, such that participants with high baseline levels of social constraints benefitted more from the fact control condition, whereas participants with low baseline levels of social constraints benefitted more from the expressive writing condition. Finally, cancer-related intrusive thoughts mediated the effect of social constraints on emotional well-being at follow up but not on quality of life at follow up. Cancer-related avoidance was not found to mediate the effect of social constraints on either emotional well-being at follow up or quality of life at follow up.

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AND EMOTIONAL APPROACH COPING IN A RANDOMIZED CONTROLLED
TRIAL OF EXPRESSIVE WRITING WITH OVARIAN CANCER PATIENTS

by

Ana Vladimirova Popovska

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Advisory Committee:

Professor Mary Ann Hoffman, Chair
Professor Ellen Fabian
Dr. Paul Gold
Professor Gregory Hancock
Professor Robert Lent
Dr. Jonathan Mohr

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Chapter 1

Introduction

With the potential for a life-threatening medical adversity, cancer could present as a traumatic experience associated with multiple psychosocial and emotional concerns, such as depression, anxiety, worsened quality of life, increased stress in social relationships, altered body image, difficulties with fulfilling social roles, and others (Jarrett et al, 2013). It has been well documented that cancer patients experience increased psychological distress in the first 24 months following a diagnosis, and are more prone to depression and anxiety than the general population (Stanton, 2006). Unfortunately, in the process of cancer treatment, the psychosocial and emotional needs of many patients remain unaddressed by their health care providers and there currently exists a great need for psychosocial interventions aimed at addressing the emotional and psychosocial concerns of cancer patients (Stanton, Luecken, MacKinnon & Thompson, 2013).

Most findings on psychological and social issues related to cancer are based on breast cancer studies, while little is known about the psychosocial and emotional issues related to more advanced and less frequently occurring cancers (Jarrett et al, 2013). Being diagnosed with an advanced cancer that has a poor prognosis, such as ovarian cancer, may be particularly distressing, as one's life may be truly threatened and the person may have little control over the progression of their disease (Arden-Close, Gidron & Moss-Morris, 2008). In the USA alone, over 20,000 new cases of ovarian cancer are diagnosed each year, with a 5-year survival rate of less than 50% (Permuth-Wey, Besharat & Sellers, 2014). Unfortunately, the mortality rate and screening tools for ovarian cancer have

changed very little over the past three decades, as the causes for this cancer remain largely unknown (Edmondson & Monaghan, 2001). Although a genetic risk has been recognized for a small percentage of cases, many cases of ovarian cancer remain idiopathic, making screening for it difficult (Edmondson & Monaghan, 2001). Patients diagnosed with ovarian cancer, whether new or recurrent, often report fear of death or fear of cancer recurrence, as well as multiple psychological and physical stressors related to the cancer or side effects of treatment (Fitch, Gray, & Franssen, 2000). Given the distress and multiple psychological concerns associated with an ovarian cancer diagnosis (existential concerns related to survival, identity concerns related to radical removal of the reproductive organs, relational concerns, physical and psychosomatic concerns related to the cancer and its treatment), psychological interventions are needed to help patients cope with the increased stress from the experience of ovarian (Arden-Close, Gidron & Moss-Morris, 2008).

One specific psychosocial intervention designed to facilitate therapeutic outcomes for traumatic experiences is expressive writing (Pennebaker, 1997). It is a series of brief (15-20 minutes) structured writing sessions, during which participants are asked to delve deep into their thoughts and emotions about a traumatic event (Pennebaker, 1997). Research has shown that this intervention produces improved physical and mental health outcomes in a variety of populations, including cancer patients (Frattaroli, 2006). Despite its promise, it remains unclear exactly how and for whom this intervention works best. In the most comprehensive meta-analysis on expressive writing to date, Frattaroli (2006) found a small mean effect size of 0.075, with 70% of 146 included studies reporting a positive effect, 25% reporting a negative effect and 5% reporting a null effect. The

variability of reported effect sizes suggests the presence of moderating variables, on which Frattaroli (2006) also reported.

While a promising brief and cost-effective psychosocial intervention, the effects of expressive writing with cancer populations remain mixed, with the majority of studies reporting null main effects in cancer samples, as shown in a recent review (Merz, Fox & Malcarne, 2014). Most findings are based on participants with breast cancer and few studies have focused on advanced cancers and gynecological cancers, where physical symptoms may be more pronounced, the prognosis poorer and associated psychological distress higher (Arden-Close, Gidron & Moss-Morris, 2008). Despite inconsistent main effects on physical and psychological outcomes, significant moderating effects have emerged in a number of studies that failed to detect main effects (Merz, Fox & Malcarne, 2014). Frattaroli's (2006) findings also point to the important role of individual differences on the effects of expressive writing for different outcomes. To this end, future research recommendations emphasize the importance of studying moderating and mediating variables, especially for promising psychosocial interventions with cancer patients, as little is known about how and for whom interventions work best and when they should not be recommended (Stanton, Luecken, MacKinnon & Thompson, 2013).

Some of the moderators that have received support in the literature are social constraints, which represent real or perceived social conditions that limit opportunities for disclosure of cancer-related thoughts and emotions to others, and emotional approach coping, a construct that captures one's openness to processing and experiencing emotions as a coping mechanism (Merz, Fox & Malcarne, 2014). The current study examined the

role of these two moderators, conceptualized in a cognitive processing framework of disclosure in expressive writing.

Viewing the medical adversity of an advanced life-threatening cancer as a traumatic experience, we can understand the effects of expressive writing with cancer patients through a cognitive processing model that emphasizes the emotional and cognitive integration of traumatic material with previously held beliefs and assumptions about the world (Horowitz, 1986). Expanding on this framework to include social factors, Lepore (2001) proposed that if cancer patients do not have the opportunity to disclose and process emotionally disturbing material related to their cancer because of social constraints, then they would experience increased cancer-related avoidance and increased cancer-related intrusive thoughts, leading to increased psychological distress. In Horowitz' (1986) original theory of cognitive adaptation to trauma, avoidance of traumatic material and intrusive thoughts about it result from lack of integration of the traumatic material with previously held assumptions and beliefs about the world. Both models presume that disclosure leads to integration and making sense of traumatic experiences, thus alleviating psychological distress.

Coping style, in particular the way one approaches one's emotions, has also been studied as an individual difference variable that may moderate the effects of expressive writing (Merz, Fox & Malcarne, 2014). Niles, Haltom, Mulvenna, Lieberman & Stanton (2014) proposed that for expressive writing to be an effective intervention, its emotional demands for disclosure need to match individuals' preferences for emotional expressivity. Even within a receptive social context, some individuals may be less likely to disclose their distressing thoughts and emotions about cancer due to their general tendencies for

expressing and processing emotions. Austenfeld and Stanton (2004) proposed emotional approach coping, conceptualized as the tendency to express and process one's emotions, as a distinct coping strategy that could affect adjustment outcomes for stressful experiences. Emotional approach coping may moderate the effects of expressive writing because the intervention demands delving into one's deepest thoughts and emotions about stressful experiences, which could be a better fit for participants who already tend to express and process their emotions. Niles et al (2014) showed that expressive writing lead to increased anxiety in healthy adults who tended not to express their emotions as a preferred coping strategy. The authors proposed that the effects of expressive writing could be due to the fit of the situational demands of the intervention and personal resources available to the individual, in what they called a *matching hypothesis* or more generally, a person-environment fit model.

The review of findings shows that as a psychosocial intervention, expressive writing could be effective in reducing psychological distress and potentially improving physical outcomes in patients with an advanced cancer but its effects are likely moderated by social constraints and emotional approach coping. Thus, we expected this intervention to be most effective for participants who experience social constraints to disclosing their cancer experiences, and also tend to use the coping strategy of expressing and processing their emotions about distressing events. If on the other hand, they tend not to use emotional approach coping, then asking them to delve deeply into their deepest thoughts and emotions about cancer, may actually be experienced as more distressing than therapeutic and may not lead to beneficial outcomes. For individuals who report low social constraints to disclosure and use emotional approach coping as a preferred coping

strategy, then expressive writing may not make a difference, as they may have already found opportunities for disclosure and processing in their social networks. These effects were tested in a randomized controlled experiment with an experimental condition of expressive writing, in which participants were asked to write about their deepest thoughts and emotions about cancer and a fact control condition, in which participants were asked to write about the facts about their cancer.

Combining Lepore's (2001) social-cognitive model of adjustment to cancer and a person-environment fit model for effective psychosocial interventions (Niles et al, 2014), we predicted that both social constraints and emotional approach coping would be significant moderators on the effects of writing condition. In addition, Lepore (2001) predicted that social constraints lead to increased psychological distress by way of increasing cancer-related avoidance and intrusive thoughts, which the current study tested in a series of mediation analyses.

The purpose of the current study was twofold: First, to examine the moderating effects of two variables, social constraints and emotional approach coping, on the effects of writing condition on emotional well-being and quality of life outcomes at follow up in participants diagnosed with ovarian cancer, using a randomized controlled experiment. A second purpose was to examine the predicted mediation of cancer-related avoidance and cancer-related intrusive thoughts (Lepore & Revenson, 2007) on the effects of social constraints on emotional well-being and quality of life at follow up. Although previous studies with cancer patients report mostly null main effects of expressive writing on psychological and health outcomes, treatment effects of writing condition were also examined, in addition to the proposed moderation and mediation effects. The present

study contributes to the current need to understand mechanisms and moderators of promising psychosocial interventions, such as expressive writing, with cancer populations and addresses existing gaps in the literature on psychosocial research with individuals with advanced cancer (Stanton, Luecken, MacKinnon & Thompson, 2013).

Chapter 2

Literature Review

A cancer diagnosis can be a life-altering and extremely distressing event. Individuals living with cancer often face a host of psychosocial issues, including psychological distress, depression, anxiety, existential concerns related to possible death or fear of recurrence, changing social and family relationships, decreased quality of life and others (Jarrett et al, 2013). Stanton (2006) conducted a literature review aimed to document the prevalence of psychosocial concerns of cancer patients and the need for development of psychological interventions to address such concerns. She found that the first 24 months after a cancer diagnosis often carry the highest risk for psychological distress, as the prevalence rates of clinically significant depression and anxiety in cancer patients during that time often exceed those found in the general population. The majority of patients also experience multiple psychosocial issues related to their cancer experience, including decreased quality of life and possible functional limitations, multiple social and financial stressors, changed body image, psychosexual concerns, fear of recurrence and concerns over genetic risks for family members and others.

In a recent selective review of sixteen other reviews on psychological and social issues related to cancer, Jarrett et al (2013) found that cancer patients are more likely to experience clinical levels of depression at a higher rate compared to the general population, especially if patients are younger, with a more advanced cancer and increased physical symptoms. Research evidence is inconsistent regarding whether cancer patients as a group experience higher levels of anxiety than the general population but certain subgroups, such as those with more advanced cancers and those who are younger and

with more pronounced physical symptoms may experience increased anxiety. This review also shows that psychological distress tends to be associated with decreased quality of life and lower socioeconomic status among cancer patients. It is worth noting that many studies measure psychological distress as a composite of depression and anxiety scores, producing some overlap between findings.

Jarrett et al (2013) found that fear of recurrence is a frequent concern for patients and families alike. Social support is often positively associated with psychological adjustment to cancer, although the evidence for this link tends to be inconsistent and there is not strong evidence to relate social support with survival and recurrence rates. Jarrett et al (2003) note that future research should include the use of rigorous experimental and prospective designs with comparison groups of different treatments, the use of well validated measures, use of clear definitions for the issues measured, and studying one cancer type at a time rather than grouping patients with different cancers in one study.

Both Jarrett et al (2013) and Stanton (2006) underscore that the majority of findings on cancer-related psychological issues come from studies using samples of women with early stage breast cancer and mostly White patients in Western societies - factors that may limit the generalizability of research findings to other populations. The psychosocial and emotional issues due to other cancers, especially more advanced and less frequently occurring cancers remain largely unexamined, although research suggests that advanced cancers often cause increased distress (Arden-Close, Gidron & Moss-Morris, 2008). The paucity of research on advanced and less common forms of cancer may be due in part to challenges in obtaining participants and attrition due to mortality.

One of the purposes of the current study was to address the need for research on psychosocial issues related to advanced cancer. This literature review examines the specific psychosocial concerns of ovarian cancer patients, and then outlines theoretical and empirical literature related to expressive writing, a brief intervention that has shown promising results for improved health and psychological outcomes in healthy and medical samples (Pennebaker, 1997). The intervention has been used with a variety of cancer populations as a tool to address psychosocial concerns related to the cancer experience but findings to date have been mixed or small in effect, leading some to investigate the moderating role of social factors and coping mechanisms (Merz, Fox & Malcarne, 2014). This study specifically focused on those two moderators that have been found to have significant effects on expressive writing – social constraints and emotional approach coping – in a theoretical framework that suggests their importance for cognitively processing the stressful experience of cancer.

Ovarian cancer

Epidemiology.

Ovarian cancer is one type of advanced cancer that has been understudied in psychological research to date. It actually comprises multiple related diseases with various cell origin but over 90% of cases diagnosed in developed countries are epithelial in nature (Permuth-Wey, Besharat & Sellers, 2014). Most epidemiologic literature refers to epithelial ovarian cancer as “ovarian cancer” and does not discuss other types in detail (Permuth-Wey, Besharat & Sellers, 2014). For this reason, this study also referred to epithelial ovarian cancer as simply “ovarian cancer” and assumed that most literature that

used the broad term ovarian cancer referred to epithelial ovarian cancer, unless otherwise specified.

Current estimates show that just over 200, 000 new cases of ovarian cancer are diagnosed each year worldwide, of which close to 125, 000 are estimated to result in death (Farghaly, 2014). In the USA alone, The American Cancer Society estimated 22, 240 new cases for 2013 with 14, 230 cancer-related deaths (<http://www.cancer.org/cancer/ovariancancer/index>). The highest incidence of ovarian cancers is found in the developed societies of North America and Northern Europe, whereas incidence in less developed regions of the world is reported to be lower (Permeth-Wey, Besharat & Sellers, 2014). It is unclear whether ovarian cancer is uncovered more frequently in developed countries due to more developed medical systems and under-reported or under-diagnosed in less developed regions or if other geographic and genetic differences exist. Although relatively rare (a woman's chance of developing ovarian cancer over her lifetime is estimated to be 1.4% and ovarian cancer accounts for only about 3% of cancers in women), when diagnosed, ovarian cancer is the deadliest cancer of the female reproductive system and the fifth most deadly cancer in women (Permeth-Wey, Besharat & Sellers, 2014).

The five-year survival rate has doubled in the past 30 years but it still remains under 50%, partly because in its early stages ovarian cancer often remains asymptomatic and even later stage symptoms can remain vague and generalized (Farghaly, 2014; Sugarbaker & Helm, 2014). Although over 90% of stage I ovarian cancer if detected at that stage could be treated effectively, more than three-quarters of diagnoses are made at an advanced stage when the 5-year survival rate is estimated to be only 15-20% (Nolen &

Lokshin, 2014). Symptoms associated with later stage disease may include enlarged ovaries, abdominal pain, urinary frequency and urgency, bloating, indigestion, early satiety and painful intercourse, with symptoms persisting most days (Sugarbaker & Helm, 2014).

The risk factors for this disease are not completely understood and many cases remain idiopathic. There is evidence for an increased genetic risk in women who carry mutations in two genes that have been associated with breast cancer, BRCA1 and BRCA2, and in some cases breast and ovarian cancer can co-occur in families and individuals (Friedrich, 2014). Even then, only 5-10% of cases tend to be associated with these genetic mutations and many women who do not show such mutations still develop ovarian cancer (Tinelli et al, 2014). Unfortunately, screening tools have changed very little over the past three decades and there currently does not exist a cost-effective method that allows for the early detection of the cancer without exposing patients to invasive medical procedures with adverse effects (Edmondson & Monaghan, 2001; Nolen & Lokshin, 2014).

Depending on its stage at diagnosis, ovarian cancer treatment may require surgery to remove the cancer tissue, chemotherapy or both (Butler & Lawrence, 2014). The extensiveness of surgery would depend on the spread of the disease and in patients of childbearing age preservation of fertility may be a limiting factor. Radical surgery may require the removal of both ovaries and other organs of the female reproductive tract, such as the uterus, but in advanced stage disease, the removal of all cancer tissue may not be possible if it has spread to other parts of the body (Butler & Lawrence, 2014). Side effects of surgical treatment may be both somatic and psychological and could include

loss of reproductive function, onset of premature menopause, vaginal dryness and discomfort, sexual dysfunction, concerns related to body image, a decreased sense of self-worth, mood changes, and others, in addition to side effects of chemotherapy, which may include fatigue, nausea, vomiting, weight loss, pain and worsened cognitive functioning (McCorkle, Pasacreta & Tang, 2003).

Psychosocial aspects of ovarian cancer.

Given the seriousness of this type of cancer and the invasiveness of treatment, psychosocial concerns related to ovarian cancer are extensive and may include negative side effects of treatment, cancer-specific symptoms, increased psychological distress related to a poor prognosis, lack of adequate social support, changing interpersonal and family dynamics, financial and other stressors and many others (Farghaly, 2014).

A qualitative analysis of correspondence (n = 21,806 pieces sent to a newsletter for women fighting ovarian cancer over a period of 6 years) examined the self-reported concerns about the impact of the ovarian cancer by women living with the cancer. Results showed that many women expressed needs for social support, acknowledging both the perceived social support by family and significant others and a sense of profound isolation (Ferrell, Smith, Ervin, Itano, & Melancon, 2003). Women also reported distress over how their cancer could affect their families, including concerns over passing a genetic risk to their daughters. Overall, women reported a sense of bonding and sisterhood with other ovarian cancer patients and reported experiencing support, encouragement and less isolation due to their cancer support networks. Although these qualitative findings are based on self-report, many quantitative results support the psychosocial concerns outlined by these women.

Patients diagnosed with ovarian cancer, whether new or recurrent, often report fears of death or cancer recurrence, as well as multiple psychological and physical stressors related to the cancer or side effects of treatment (Fitch, Gray, & Franssen, 2000). One of the few reviews of psychological factors related to ovarian cancer specifically shows that younger age at diagnosis, a more advanced cancer stage, more pronounced physical symptoms, a recent diagnosis, and poor perceived social support are all correlated with experienced psychological distress in women diagnosed with ovarian cancer, based on findings published between 1997 and 2004 (Arden-Close, Gidron & Moss-Morris, 2008). In general, psychological distress has been measured as a composite score of anxiety, depression, and in some cases post-traumatic stress and may refer to a broad range of emotional and psychosocial concerns that cancer patients face (Absolom, Takeuchi, Hall & Velikova, 2014). In a review, Arden-Close, Gidron and Moss-Morris (2008) conclude that there has been limited research on the psychosocial concerns of patients with this type of cancer and very few psychosocial intervention studies with patients with gynecologic cancers. Assessing the quality of findings provided by individual empirical studies, the authors note that prevailing measurement issues in the literature include the lack of clear and specific definitions of key psychological constructs such as quality of life in cancer patients and inconsistent use or lack of well-validated instruments. In addition, studies frequently group patients with different kinds of cancers, rather than reporting on specific cancer populations.

Fear of recurrence remains one of the major concerns for many ovarian cancer patients, increasing their psychological distress (Crist & Grunfeld, 2013). This fear may

be based on a poor prognosis as research shows that 70% of patients with advanced ovarian cancer experience recurrence within 5 years of treatment and that most die because their recurrent cancer becomes resistant to chemotherapy (Farghaly, 2014). Crist and Grunfeld (2013) found younger age to be the most consistent predictor of increased fear of recurrence. There was also strong evidence for the association between increased physical symptoms and higher levels of fear of recurrence, with other associated factors being decreased optimism, family stressors and fewer significant others.

Fitch, Gray and Franssen (2000) surveyed 263 Canadian women with either recurrent (93) or first-time ovarian cancer (170) on their perspectives about living with ovarian cancer. Most frequently identified problems included fear of recurrence, fear of dying, side effects of treatment, difficulty sleeping, changes in body image perception, difficulty with bowels, difficulty concentrating, difficulties managing household responsibilities, anger, pain, issues with sexual functioning, diet and nutrition, and self-blame. When asked about whether they believed they had received adequate help in different problem areas, women were least likely to have received help related to their fears of recurrence and dying, feelings about their bodies, issues related to sexual function, self-blame, anger, and difficulty concentrating. Overall, women reported receiving adequate help for physical problems more often than for psychosocial issues related to the cancer.

When asked about their dissatisfaction with various kinds of information received, some of the most frequently cited issues were dissatisfaction with insufficient information related to possible emotional reactions, along with insufficient information about arranging to speak with another woman with ovarian cancer and finding self-help

groups (Fitch, Gray & Franssen, 2000). Only one-third of women indicated that they had not felt the need to talk to someone about their cancer-related difficulties. Findings of this study suggest that many of the psychosocial and emotional issues related to the cancer experience were not adequately addressed or help was either unavailable or inadequate.

Bodurka-Bevers et al (2000) evaluated psychological distress and quality of life in 65 (26%) women with early stage epithelial ovarian cancer and 181 (74%) with advanced stage disease, measuring depression, anxiety, several dimensions of quality of life (physical, functional, emotional, social, and ovarian cancer-specific concerns), and performance status (a self-report global measure of severity of symptoms). Half the sample was in active treatment and the other half was receiving post-therapy surveillance. They found that 21% of the sample met criteria for clinically significant depression and 29% scored in the uppermost quartile for anxiety symptoms. Poor health status was significantly associated with increased depression and anxiety and worsened quality of life in all domains except for social. In addition, patients who were 50 and younger were significantly more likely to report depression and a poorer quality of life than older patients. Patients in active treatment were more likely to report decreased emotional and functional quality of life, consistent with often reported negative side effects of treatment. Overall, the levels of clinically significant depression and anxiety in this sample were higher than those found in the general population and highest for patients with worst reported performance status.

Peterson, Graham and Quinlivan (2005) assessed psychological symptoms and levels of perceived social support in 26 women with a new diagnosis of gynecologic cancer (9 had ovarian cancer) at the time of initial diagnosis and 6 weeks later. The

authors administered a list of 90 psychological symptoms initially and at 6 weeks follow-up, along with questions on perceived social support and demographics. Results showed no significant differences in levels of psychological symptoms over a 6-week time period after diagnosis, regardless of cancer type. Women with lower reported levels of perceived social support endorsed significantly higher psychological symptoms at both times compared with women who reported higher levels of perceived social support. Although this study did not examine ovarian cancer patients specifically, it shows that initial levels of distress after a new gynecologic cancer diagnosis (including ovarian cancer) do not subside significantly over the first 6 weeks after diagnosis and that lower levels of perceived social support may be a risk factor for increased distress.

A study by Lutgendorf et al (2002) found that despite initial decreases in quality of life domains and mood among 98 newly diagnosed gynecologic cancer patients with both early and advanced stage diseases (25 were ovarian cancer cases), after one year, 75 of the women reported significant improvements on both quality of life and mood measures. Women with an initial diagnosis of an advanced cancer were more likely to report decreased functional and physical well-being on quality of life questionnaires, consistent with increased symptoms in later stage cancers. Both early and advanced stage patients reported significantly higher mood disturbances than previously assessed healthy gynecologic outpatients. At one year follow up, both groups reported significant decreases in levels of anxiety, depression and confusion with concurrent increases in emotional and functional wellbeing. Trajectories of change did not differ between early and advanced stage patients, however, patients with advanced stage diagnoses continued reporting increased fatigue, depression and anxiety, compared to healthy controls. These

findings indicate that although both early and advanced stage patients experience improvements in quality of life and mood domains over the first year after diagnosis, advanced cancer patients may continue experiencing elevated levels of symptoms over time. The subjectivity of self-reports in this study may be a limitation in assessing quality of life and mood but it remains one of the most commonly used method in the literature.

Lutgendorf et al (2002) found that with regards to personal resources, patients who used more acceptance and positive reframing coping at the time of initial visit scored better on quality of life measures at one-year follow up, whereas those who used disengagement coping at study entry reported higher distress, decreased quality of life and poorer doctor-patient relationships after one year. Greater seeking of emotional social support was associated with improved social wellbeing at follow up and better doctor-patient relationships. Such results underscore the importance of patients' coping styles and social support seeking behaviors in adjustment to the cancer experience over time.

Most of the reviewed literature is based on self-report surveys with different recruitment strategies and varying time since diagnosis. Despite limitations in the method of self-report and variability in the cancer samples with regard to time since diagnosis and treatment status, findings converge to show increased distress associated with a diagnosis of ovarian cancer, limited psychosocial supports integrated with treatment, and cancer-specific challenges faced by many patients who may not be sufficiently prepared to cope with them. Given the increased distress and multiple psychosocial concerns associated with ovarian cancer, psychological interventions are needed to help patients cope with their experience. Expressive writing is one specific psychosocial intervention designed to facilitate positive health and psychological outcomes through engaging

individuals in writing about emotional and cognitive aspects of a traumatic event that may not have been shared with others.

Expressive Writing

In a series of several brief (15-20 min) structured writing sessions, participants are asked to delve deep into their thoughts and emotions about a traumatic event (Pennebaker, 1997). The expressive writing paradigm was first developed on the premise that disclosure is a natural way of processing traumatic experiences and writing may benefit people who do not have the opportunity or willingness for disclosure in a social context (Pennebaker & Beall, 1986). Research has shown that this intervention produces improved physical and mental health outcomes in a variety of populations, including cancer patients (Frattaroli, 2006).

Theoretical background of expressive writing.

It remains unclear exactly how and for whom this intervention works best, although different theories for its effectiveness have been proposed (Sloan & Marx, 2004). The salutary effects of expressive writing were initially attributed to reducing emotional inhibition, which the traditional psychoanalytic view associated with worsened mental and physical health (Pennebaker & Beall, 1986). However, empirical evidence has not provided support for this model and new conceptualizations have included theories of cognitive processing, self-regulation, desensitization, social integration and others (for a review see Sloan and Marx, 2004). Given the complexity of expressive writing and the various processes that take place during and after the intervention, Pennebaker (2004) has acknowledged that multiple models may account for the effects of the writing intervention. It could be that the context of writing

provides a safe way to master one's emotions (increase self-regulation) and reduce emotional reactivity to the event (desensitization) and once this is achieved, participants may be more likely to integrate their thoughts and feelings into a coherent narrative (cognitive processing). Thus, multiple frameworks may co-explain the effects of expressive writing and research has yet to fully explore the contributions of each model. Grounding the present study in one theory could help elucidate some of the mechanisms of change for this intervention. For this reason, the current study has been situated within a cognitive processing framework, recognizing that this may not be the only explanatory model for how and why expressive writing works

Cognitive processing and cognitive adaptation theories of trauma.

Cognitive processing theory focuses on the integration of trauma-related thoughts and emotions with previously held beliefs about the world. It has received substantial empirical support, with good explanatory value for at least some mechanisms involved in the writing paradigm (Sloan & Marx, 2004). However, this model does not fully explain the effects of writing observed in studies about imaginary traumas or perceived benefits and evaluating it presents challenges because of the difficulty of measuring cognitive processes. For this reason, some researchers have used linguistic indices, such as types and frequency of words used, as measures of cognitive changes across writing sessions (Pennebaker & Seagal, 1999). It still remains debatable whether such linguistic indices can accurately capture cognitive processes, with many findings supporting the cognitive processing theory as correlational, which does not exclude the possibility of an alternative mechanism producing the observed changes (Sloan & Marx, 2004). Despite such research

shortcomings, cognitive processing theory remains one of the major recent conceptualizations of the effects of expressive writing.

The cognitive processing model of the effects of expressive writing derives from a framework of re-organizing traumatic experiences with previously held beliefs and schemas about the world, generally referred to as cognitive adaptation to trauma (Horowitz, 1986). Most people hold general beliefs that their world is just, benevolent and controllable (Janoff-Bulman, 1989). When these core beliefs, also known as the assumptive world, are challenged by an uncontrollable event that threatens one's psychological or physical wellbeing, intense psychological distress may be experienced. The broad framework of cognitive adaptation proposes that the resolution of psychological trauma results from integrating traumatic events with pre-existing schemas, in which intrusive thoughts and emotions about the traumatic event, as well as avoidance of traumatic stimuli may need to be dealt with (Horowitz, 1986).

Cancer as a traumatic experience. A diagnosis of cancer is often unexpected, can be potentially life threatening, and is likely to significantly disrupt one's life and similar to psychological trauma, it presents a threat to one's emotional well-being. Being diagnosed with an advanced cancer that has a poor prognosis, such as ovarian cancer, may be particularly traumatic, as one's life is truly threatened and the person may have little control over the progression of their disease. Cancer patients often experience intrusive thoughts and avoidance about their cancer (Lepore & Revenson, 2007), reporting high levels of psychological distress following a diagnosis, all of which would be consistent with a conceptualization of a traumatic experience (Horowitz, 1986).

Empirical support for expressive writing interventions.

Since the first study on expressive writing (Pennebaker & Beall, 1986), a number of studies have been conducted showing the effectiveness of this brief intervention on health outcomes with different populations (Pennebaker, 1997; Frattaroli, 2006). A review by Pennebaker (1997) showed that the writing activity has health and psychological benefits in the long term (although it may stir up strong emotions and increase distress in the short-term) and in general, participants find it to be a meaningful experience. Some of the outcomes observed with healthy participants include drops in physician visits in the months after writing, increased immune functioning, improved grades, better job placement rates among unemployed participants, as well as decreased absenteeism among workers (Pennebaker, 1997; Frattaroli, 2006). The writing intervention has also been found to have positive effects on mental and physical health with various medical populations, including cancer patients, chronic pain patients and others (Frattaroli, 2006).

Supporting a cognitive processing model, participants reported attaining insight as the main reason why expressive writing was beneficial to them (Pennebaker, Colder & Sharp, 1990). Pennebaker (1993) found that participants who benefited most from the expressive writing condition showed an increase in the use of causation and insight-oriented language during the course of their writing session and those who did not benefit did not show such an increase. In re-analyzing data from six previous expressive writing studies with a specially developed program that provided indices of the use of positive and negative affect words (measures of affective processing) and insight and causal words (measures of cognitive processing), Pennebaker and Seagal (1999) found

that participants who benefitted the most from the writing intervention were those who showed the most increase in the use of insight and causal words in their writing. Similarly, Smyth, True and Souto (2001) found that participants who wrote about trauma in a narrative fashion benefitted from the intervention but those who wrote about their traumas in a fragmented fashion (composing lists of feelings, facts, etc) did not differ from the control group. This supports the idea that building a narrative, from a cognitive processing model, is important in healing trauma.

Findings from meta-analytic studies. To date, there have been several meta-analyses on experimental writing studies. The first (Smyth, 1998) only included 13 studies and another (Frisina, Borod & Lepore, 2004) focused on the effectiveness of experimental writing with clinical (psychiatric and medical) populations. Both showed support for the positive effects of the writing intervention but they were limited in scope, in that they each included few studies and used a fixed effects method, limiting the generalizability of their findings only to participants similar to the ones included in the individual studies.

The most recent and most comprehensive meta-analysis on studies using the expressive writing paradigm provides the most compelling evidence for the effectiveness of this brief writing intervention (Fratraro, 2006). It included 146 individual studies published between 1986 and 2004 and used a random-effects approach, treating each study as an individual unit of analysis. This allowed for generalizing the findings of the meta-analysis to similar studies not included in the meta-analysis and to future studies. The overall effect size found in this meta-analysis is smaller than reported in the previous two meta-analyses but this may be due to the large portion (48%) of

unpublished studies included, which were found to have smaller effect sizes than the published ones. This meta-analysis also included studies with samples that varied in terms of health and psychological conditions, age, student or community status, gender and other participant variables.

Study outcomes were first grouped into six categories: psychological health, physiological functioning, reported health, health behaviors, general functioning, and subjective impact of the intervention. Effect sizes were averaged within an outcome type and then the averages for each outcome type were averaged into a single effect size for the whole study. In this way, health and psychological outcomes were weighted equally to obtain an average effect size for the intervention for the entire study. Overall effect sizes ranged from $r = -.291$ to $r = .592$. In total, 36 studies (25% of all studies) had a negative overall effect size, 8 (5%) had a null effect size, and 102 studies (70%) had a positive effect size. The average effect size (unweighted) was $r = .075$ (small, $p < 0.001$).

Measures of various domains of psychological health were included in 112 studies and the average effect size for psychological health was $r = 0.056$ (small, $p = 0.00014$). When different domains of psychological health were analyzed, three effect sizes emerged as significant in a random effects analysis, the greatest effect size emerged for distress ($r = .102$, small), followed by depression ($r = .073$, small) and positive functioning ($r = .045$, small).

Reported health was variously measured in 95 studies, producing an average unweighted effect size of 0.072 (small, $p = 0.00011$). Studies that selected participants for a physical health problem had significantly higher effect sizes (small-to-medium)

for reported health than studies with general recruitment. This may suggest that the intervention may be more potent for medical populations, although it could also be that healthy populations may be subject to floor effects and medical populations may be more focused on their health outcomes.

The subjective impact of the intervention, measured in 33 studies, produced an average unweighted effect size of 0.159 (small, $p = .000035$). Within this category, positive attitude about the intervention (measured in 26 studies) had a significant effect size of $r = 0.270$ and attempts to process/make sense of the event (measured in 21 studies) had a significant effect size of $r = .132$. This suggests that overall the intervention was received well by participants and effectively facilitated their processing of the reported traumatic event.

The effect sizes for psychological health, reported health, and subjective impact of the intervention were found to have significant within-group variability, suggesting that other variables may moderate the intervention effects. It was found that stress level of participants moderated the overall effect size and the reported health effect size, such that participants with higher reported stress levels experienced greater benefit for the overall effect of the intervention and reported health. Optimism moderated psychological health and reported health outcomes, with pessimists benefitting more from the intervention in these areas.

The timing of follow-up was a significant moderator for the overall effect size and the effect size on psychological outcomes of the intervention, such that follow-up of less than 1 month (but at least 1 day after the intervention) produced greater effects than follow up of at least one month. These findings suggest that not surprisingly, the

effects of the intervention diminish with time and that reported effect sizes may be dependent on the time elapsed between the intervention and follow-up. The average follow-up time for studies in the current meta-analysis was 3 months after disclosure.

Regarding study design, including three or more experimental disclosure sessions produced an overall intervention effect that was twice as large as having fewer than three sessions. Length of session also moderated the overall effect of the intervention and the effect on reported health, with sessions of more than 15 min producing the greatest effects. The spacing of writing sessions was not found to moderate any of the effect types, with sessions scheduled daily producing similar effects to weekly sessions. The average study in the meta-analysis had four disclosure sessions of 20 minutes each, and in 53% of the cases, sessions were scheduled daily.

Studies in which disclosure took place at the participant's home had significantly higher effects on psychological outcomes than studies that took place in more controlled settings, such as a laboratory. In addition, privacy during disclosure (when participant disclosed in a room by themselves rather than in a group setting) produced significantly higher effect sizes for the overall effect of the intervention and psychological health outcomes. Writing about more recent events also produced larger effect sizes.

Based on Frattaroli's (2006) findings, the optimal conditions for detecting the largest effects of an expressive writing intervention would be having at least 3 writing sessions of at least 15 min each, in a private home setting, using a medical sample to write about a recent traumatic event that is highly distressing, and a follow up of less than one month. The current study was developed based on these optimal conditions.

Expressive writing as a proposed psychosocial intervention with cancer patients. Although expressive writing has shown promise as a brief psychosocial intervention with the potential to improve health and psychological outcomes in healthy college students, community samples and various medical populations, its effects with cancer patients have not been systematically examined (Merz, Fox & Malcarne, 2014). The variability in effect sizes documented by Frattaroli (2006) clearly speaks to the presence of moderation effects, some of which were detected in the meta-analysis and were found to differ by outcome types. Although most studies reported positive, albeit small, effects and generally positive attitudes towards the intervention, it is worth noting that 25% of studies included in Frattaroli's (2006) comprehensive meta-analysis reported an overall negative effect and 5% reported a null effect. Thus, in 30% of studies a positive effect was not found and in some cases, participants may have been harmed by the intervention.

The latest review focusing on expressive writing studies with cancer patients documents mixed effects in a variety of samples, asserting that further investigation on the effects of this intervention is needed before it could universally be recommended as a convenient cost-effective intervention addressing psycho-social concerns of cancer patients (Merz, Fox & Malcarne, 2014). Merz, Fox and Malcarne (2014) identified 13 studies using an experimental design with an expressive writing and control condition with different cancer samples. The majority of studies (9 out of 13) were done with breast cancer patients in different stages (some were international samples) and only one targeted gynecological cancer. Findings showed mostly null main effects for expressive writing but few studies reported main effects on physical and psychological outcomes in

breast cancer patients. Most studies reported moderation effects, suggesting that expressive writing may be more beneficial to some participants based on individual differences, such as levels of emotional disclosure, social constraints and perceived emotional social support. Due to the small number of studies included in the review, meta-analytical analyses could not be performed and quantitative conclusions about the review findings were not reached.

The findings from this review show that expressive writing effects in cancer patients may be moderated by individual differences, as main effects on physical and psychological outcomes have been mostly null or undetected. This suggests that new research needs to focus on investigating moderating variables, as main effects could be difficult to detect in highly symptomatic samples where ceiling effects on health outcomes are likely and both depressive and anxiety symptoms could be confounded with side effects of treatment (Newport & Nemeroff, 1998). In fact, new directions in research on psychosocial interventions with cancer patients also recommend the study of moderating and mediating variables to help explain how psychosocial interventions work and for whom they are most effective (Stanton, Luecken, MacKinnon & Thompson, 2013). Some investigators have already proposed frameworks for moderating variables with regard to emotional disclosure and adjustment to cancer, which will be reviewed next.

One model incorporating the moderating effects of social constraints expands on the cognitive adaptation theory of trauma and uses a cognitive processing model to propose that emotional adjustment to cancer is affected by the social context in which cancer-related thoughts and emotions are processed Lepore (2001). As with any

stressful event, the availability of social support plays an important role in patients' adjustment to their cancer experience, with perceived emotional support having the strongest positive link with psychological outcomes related to cancer adjustment (Helgeson & Cohen, 1996). If cancer patients have the opportunity to disclose and process emotionally disturbing material related to their cancer in a benign and empathic social environment, then they would be more likely to integrate their traumatic experiences and reduce the psychological distress associated with them (Lepore, 2001). While cancer-related intrusive thoughts may lose their emotional impact if shared and processed with supportive others, the inability to engage in sharing and processing one's experience with cancer may hinder emotional adjustment and cause prolonged distress.

Unfortunately, not everyone has a social support system that provides adequate opportunities for empathic disclosure. Even those with well-developed social networks may experience rejecting responses or may hesitate to share their distress. And those with less social support may have fewer opportunities to discuss their stressful experiences and concerns. In addition, significant others may inadvertently discourage cancer patients from processing their experiences by wrongly believing that discussing distressing thoughts and emotions related to the cancer experience may be stressful for the patients (Helgeson & Cohen, 1996). For patients lacking adequate social support and social networks that facilitate disclosure about cancer-related thoughts and emotions, expressive writing may provide an avenue for expression and exploration of distressing thoughts and emotions. Viewed through a cognitive processing perspective, this brief intervention would provide the opportunity for integration of thoughts and

emotions related to the traumatic experiences of cancer and facilitate adjustment to the new realities patients may be experiencing. Counteracting environmental limitations, such as social constraints, this intervention may help patients who would otherwise not have the opportunity to express and explore their cancer-related distressing thoughts and emotions.

Going a step further, Niles et al (2014) proposed that it is the fit between the demands of the intervention and individual resources that may best explain the effectiveness of psychosocial interventions, including expressive writing. In what they refer to as the matching hypothesis, Niles et al (2014) propose that the effectiveness of an expressive writing intervention would ultimately be determined by the fit between the demands of the intervention (delving into one's deep thoughts and emotions about a traumatic subject) and the resources available to the individual, such as their preferred coping style and social constraints. The present research uses this person-environment fit model to explore the effects of the proposed moderating variables, social constraints and emotional approach coping on expressive writing.

The current study utilized the cognitive processing model of trauma to understand the effects of writing condition (expressive writing or fact control) in women with ovarian cancer, considering the social constraints they face to disclosing cancer-related thoughts and emotions and their tendencies for emotional approach coping. The research has been situated in a person-environment fit model, as informed by the frameworks proposed by Lepore (2001) and Niles et al (2014) on social constraints to emotional disclosure in adjustment to cancer and personality predispositions towards emotional processing and emotional expressivity. Moderator

effects were examined in a randomized controlled experiment, consisting of an expressive writing condition that asked participants to write about their thoughts and emotions about their cancer and a control condition that involved writing about the facts related to the cancer. The mediation effects of cancer-related avoidance and cancer-related intrusive thoughts were also examined.

Empirical evidence for expressive writing with cancer populations.

One of the earliest studies of expressive writing with cancer patients investigated the effects of writing in women with early stage breast cancer who had recently completed treatment (Stanton et al, 2002). By the authors' report, this was only the second study of expressive writing with cancer patients, the previous one having been published in 1999 (Walker, Nail & Croyle, 1999). Walker, Nail and Croyle (1999) asked participants to write about a general stressful experience, rather than a cancer-related one and only looked at the effects on psychological outcomes, finding no significant effects. In that regard, Stanton et al's (2002) work introduced cancer-specific writing instructions and examined the effects of different writing conditions on both physical and psychological outcomes with different cancer samples.

In their first investigation of expressive writing with 60 early stage breast cancer patients within 20 weeks post-treatment, Stanton et al (2002) used three writing conditions: the traditional expressive writing condition that focused on disclosure of deepest thoughts and emotions about the cancer experience, a benefit finding condition where women were asked to write about positive thoughts and emotions related to their cancer experience and a control condition that focused on writing about facts about the cancer and its treatment. Women wrote during four 20-min sessions and follow-up was

conducted after 1 and 3 months post-writing. Both physical (self-reported medical visits and negative somatic symptoms) and psychological outcomes (depression, anxiety, distress) were examined.

The groups showed no significant differences after one month, but three months post-writing, the two experimental conditions showed positive effects on physical health outcomes. The expressive writing group showed significant decreases in self-reported somatic symptoms compared to the control group; the positive writing group effects on physical symptoms were intermediate between the control and expressive writing groups. In addition, both the expressive and positive writing groups evidenced significant reductions in medical appointments for cancer-related morbidities 3 months after writing. This reduction was greater for the expressive writing group but it was still statistically and clinically significant for the positive writing group. There was no change in self-reported psychological outcomes 3 months after writing in any condition. It could be that the women could have still been worried about their prognosis and risk of recurrence or they may have felt prolonged negative side effects of treatment. Alternatively, the sample size may not have allowed for detection of a small main effect on psychological outcomes. The results from the study showed that women who had recently completed their treatment for an early stage breast cancer benefitted the most in the full expressive writing condition but they still showed improvements in a positive writing condition, with changes observed in physical health outcomes but not psychological outcomes. It is unclear how well these results would generalize to a more highly distressed population, such as ovarian cancer patients whose more advanced disease stage may be associated

with greater distress and more negative side effects of treatment and more pronounced physical symptoms.

In a follow up analysis to the same study, Low, Stanton and Danoff-Burg (2006) examined some of the mechanisms that could explain the observed health effects. Having measured physiological arousal during writing, the authors hypothesized that habituation to negative cancer-related thoughts and emotions could explain the beneficial effects of expressive writing on health. Consistent with this hypothesis, results showed greater within-session heart rate habituation in the expressive writing condition, compared with the positive and control conditions. To this effect, participants in the positive writing group used significantly more positive affect words but this did not mediate the effects of the positive writing condition on health outcomes. Thus, the mechanisms that account for the effects of the positive writing condition remain unclear. Finally, the authors expected that the observed health effects in both conditions could also partly be due to cognitive processing taking place in the process of writing over time. Results showed that the expressive writing group used the most cognitive mechanism words and that the control and positive writing groups did not differ in the use of such words. However, analyses showed that the use of cognitive mechanism words did not mediate any intervention effects. These results underscore the complex nature of writing interventions, showing that different causal mechanisms may be at play for different conditions. Since many studies do not collect physiological data during writing, it is difficult to compare these results with other findings based on self-report alone.

In a subsequent randomized controlled study on expressive writing with 62 metastatic breast cancer patients, participants were assigned to an experimental expressive

writing condition and were asked to write at home on four 20-minute occasions about cancer-related thoughts and emotions or they were assigned to a fact control condition and were asked to write about their cancer and treatment (Low, Stanton, Bower & Gyllenhammer, 2010). Depressive symptoms, cancer-related intrusive thoughts, physical symptoms and sleep quality were assessed at baseline and at 3-month follow-up. Perceived emotional social support, coping style and emotional approach coping were assessed with regards to the cancer experience at baseline. Reactions to participation were also recorded at 3-month follow up. Mood was assessed before and after each writing session.

Although there was no main effect for the writing intervention in this study, results showed that women reporting lower levels of perceived emotional support benefitted more from the expressive writing condition than women reporting higher levels of emotional support. The lack of a main effect could be due to multiple reasons: First, since both conditions required participants to write about cancer, both could have been emotionally triggering. The “true” control condition in the original expressive writing paradigm asks participants to write about trivial unemotional topics, such as their shoes (Pennebaker & Beall, 1986). Due to ethical concerns, it may not be appropriate to ask advanced stage cancer patients to write about such a mundane topic if they could benefit from writing about their cancer. The lack of main effect could also be due to ceiling effects on participants’ psychological and physical symptoms. As mentioned earlier, advanced cancer patients often experience negative side effects of treatment, including mood and emotional changes and worsened physical symptoms and they often report high distress levels related to their often-terminal conditions (Arden-Close, Gidron, Moss-Morris, 2008). It could be that the writing intervention was not powerful enough to

produce significant differences between the two groups, both of which wrote about cancer or that the study lacked power to detect small effects. Nevertheless, the significant interaction suggests that the expressive writing intervention in its full form may be beneficial for those patients lacking adequate perceived social emotional support. Social factors, such as social constraints on disclosure and perceived social emotional support will be discussed later in a separate section.

Few studies have also used expressive writing with gynecological cancer patients (Merz, Fox & Malcarne, 2014). They show that effects of expressive writing are generally moderated by factors such as social constraints and personality dispositions, in line with the matching hypothesis of intervention effectiveness proposed by Niles et al (2014). One recent study (Arden-Close, Gidron, Bayne & Moss-Morris, 2013) on expressive writing with ovarian cancer patients and their partners found no main effects on either physical or psychological outcomes in patients or their partners but the study showed that quality of life in patients improved after the writing intervention if couple illness-related communication improved, which also provided buffering effects for illness-related intrusive thoughts on perceived stress. The study used a modified expressive writing paradigm but so far, it is the only expressive writing study with couples where one partner has been diagnosed with ovarian cancer. Results show that expressive writing may have beneficial dyadic effects that may be difficult to capture with individual patients.

The next sections will address in more detail the constructs of social constraints and emotional approach coping, as they relate to expressive writing interventions.

Social constraints as a moderator

In Lepore's (2001) social-cognitive processing model of adjustment to cancer, social constraints to disclosure play an important role. Social constraints on disclosure have been defined as "objective social conditions and individuals' construal of those conditions that lead individuals to refrain from or modify their disclosure of stress- and trauma-related thoughts, feelings or concerns. Constraints on disclosure are likely to emerge from social conditions (e.g., others' criticism, denial, withdrawal) that lead individuals to feel unsupported, misunderstood, or otherwise alienated from their social network when they are seeking social support or attempting to express their thoughts, feelings or concerns" (Lepore & Revenson, 2007, p. 315). Social constraints to disclosure about cancer-related thoughts and experiences may lead to poorer adjustment and increased psychological distress in two ways: by causing avoidance about cancer and thereby increasing psychological distress or by inhibiting cognitive processing and causing increased levels of intrusive thoughts about cancer, which have also been linked with distress (Lepore, 2001). Both avoidance and intrusive thoughts are markers of dealing with a traumatic experience (Horowitz, 1986).

Cancer patients facing high social constraints to disclosure of their cancer-related experiences show poorer psychological adjustment and increased distress associated with cancer (Lepore & Revenson, 2007). They could benefit from alternative ways of sharing and processing their cancer-related thoughts and emotions, such as through an expressive writing intervention, which could facilitate cognitive processing of the trauma associated with a life-threatening illness. One of the main predictions of Lepore's (2001) model is that individuals faced with social constraints will experience

greater avoidance in thinking about or discussing cancer-related experiences, especially with the individual(s) who were implicated in the social constraints. Research has supported this prediction, showing that cancer patients facing higher social constraints experience greater avoidance in thinking and talking about cancer (Lepore & Revenson, 2007). The authors further propose that avoidance mediates some of the association between social constraints and psychological distress. Findings to date have supported the mediating role of avoidance (Lepore & Helgeson, 1998; Zakowski, Ramati, Morton, Johnson & Flanigan, 2004). Another central prediction is that social constraints reduce individuals' opportunities to process and make sense of their cancer-related experiences. Incomplete cognitive processing, in turn, could result in intrusive thoughts about the cancer, with studies showing a positive association between levels of social constraints and levels of intrusive thoughts (Lepore & Revenson, 2007).

Zakowski, Ramati, Morton, Johnson and Flanigan (2004) investigated whether an expressive writing intervention for cancer patients may mitigate the negative effects of social constraints. One hundred and four patients who had received a first-time diagnosed of prostate (50) or gynecological (54, of which 14 patients had ovarian cancer) cancer within 5 years, who had completed active treatment and had no evidence of psychiatric problems, and who were fluent in English were recruited through clinics in the Midwestern area. Social constraints were assessed about a patient's spouse or partner and other people in the patient's life and the average from the two scales was used. Distress, avoidance and intrusive thoughts were also assessed. Participants were randomly assigned to either an emotional disclosure condition or a neutral control condition and wrote at home for 20 minutes on three

consecutive days, prompted by a telephone call from an experimenter. At 6 months post-writing, participants completed the same baseline measures.

Participants in the control condition with higher levels of social constraints reported the most distress at follow-up, whereas participants in the experimental condition reported lower levels of distress at follow up, similar to the levels of distress reported at follow up by participants with low levels of perceived social constraints. Expressive writing buffered the effects of perceived high social constraints on psychological distress but the intervention did not make a difference for patients who initially reported low levels of social constraints. The effect size of the intervention was reported to be relatively small, and although significant reductions in distress among patients with high social constraints were found in the experimental group, the level of distress was reduced by less than one standard deviation above the mean, rendering the results clinically non-significant (i.e. distress levels at follow up were not reduced from clinical to non-clinical levels).

In addition, control participants with higher levels of reported social constraints at baseline reported the highest levels of cancer-related avoidance. Those in the writing condition and those with lower initial levels of social constraints experienced lower levels of avoidance at follow up. Cancer-related avoidance was found to be a mediator of the effects of the writing intervention on distress among participants with high levels of social constraints. Levels of intrusive thoughts did not change as a function of condition or levels of social constraints. These findings show that the expressive writing intervention may be more beneficial for some patients than others, especially those facing high constraints to emotional disclosure within their

social support systems.

In a study with 178 prostate cancer survivors, Lepore and Helgeson (1998) found similar trends in men: Cancer-related intrusive thoughts were negatively associated with mental health outcomes and social constraints moderated this relationship. Men who felt more socially constrained were also more likely to report cancer related avoidance, which in turn was found to partially mediate the relationship between social constraints from family and friends and mental health.

In a study with healthy adults preparing to take a stressful graduate examination, Lepore (1997) showed that expressive writing reduced the impact of intrusive thoughts on depressive symptoms but it did not reduce the frequency of intrusive thoughts about the stressful event. Participants in the expressive writing condition reported a decline in depressive symptoms prior to the exam, whereas depressive symptoms in control group participants declined only after the exam was over. In both groups, levels of intrusive thoughts about the exam increased prior to it but their association with depression was decreased in the expressive writing group. These findings show that expressive writing may reduce the negative impact of intrusive thoughts on psychological health, rather than their actual levels or frequency.

Emotional approach coping as a moderator

Even with a receptive social context, some individuals may be less likely to disclose and process their distressing thoughts and emotions about cancer due to their preferred or most utilized coping style. Thus, coping style may also moderate the outcomes of an expressive writing intervention that focuses on disclosure and processing of distressing thoughts and emotions. There exist multiple models for grouping coping

strategies, with one of the most used frameworks being Lazarus and Folkman's (1984) emotion-focused vs. problem-focused model of coping strategies. Emotion-focused coping consists of "attempts to manage the internal reactions due to stressors, whereas problem-focused coping aims at altering or eliminating the stressor" (Lazarus & Folkman, 1984). The broad conceptualization and operationalization of emotion-focused coping has resulted in the grouping of very different domains of coping in a single emotion-focused category (Stanton, Danoff-Burg, Cameron & Ellis, 1994; Austenfeld & Stanton, 2004).

Austenfeld and Stanton (2004) recognized that emotional approach strategies may produce very different outcomes from emotional avoidance ones and proposed that emotional approach coping strategies may be a meaningful category for understanding how people engage with stressors. To this end, they conceptualized "coping through emotional approach" at two levels - emotion processing and emotion expression: Coping through emotional processing refers to "active attempts to acknowledge, explore meanings, and come to an understanding of one's emotions" (p. 1342). Coping through emotional expression refers to "verbal or non-verbal attempts to communicate or symbolize one's emotional experience" (p. 1342). In coping with cancer, it seems that the kind of coping strategies one uses would greatly affect one's adjustment to the experience. The strategies of emotion expression and emotion processing may facilitate cognitive adaptation to the adversity of a cancer diagnosis. To our knowledge, the impact of these strategies on emotional adjustment in ovarian cancer patients has not been studied.

Furthermore, emotional disclosure, required in the expressive writing intervention, may be affected by individuals' tendencies for emotional approach coping. Niles et al (2014) showed that emotional expressivity moderated the effects of expressive writing in

a sample of 116 young healthy adults. Although the expressive writing intervention produced no main effects on physical or psychological outcomes, participants high in emotional expressivity experienced significant decreases in anxiety 3 months after the intervention, whereas those low in emotional expressivity showed a significant increase in anxiety at follow-up. The finding that participants low in emotional expressivity experienced worse anxiety after the intervention, whereas those high on emotional expressivity benefitted from the intervention suggests that expressive writing may be beneficial for some individuals and contra-indicated for others. Niles et al (2014) attributed these findings to the fit between the demand of the intervention for emotional disclosure and individuals' pre-existing coping preferences with regard to emotion approach.

In a different randomized controlled experiment, Austenfeld, Paolo and Stanton (2006) compared the effects of expressive writing with writing about future goals and a neutral control condition in a sample of 64 third-year medical students. Although no main effects of the writing interventions were found on physical or psychological health variables, the authors found that intervention effects were moderated by levels of participants' emotional approach coping. Participants high in emotional processing and emotional expression reported fewer depressive symptoms at 3-month follow up if they were assigned to the expressive writing condition, whereas participants low in emotional processing and expression reported decreased depressive symptoms at follow-up if they wrote about future goals, which did not require them to delve into their emotions. Participants low on emotional processing in the goal writing condition also had fewer health care visits at follow up compared to the control and expressive writing conditions.

These findings certainly suggest that the effects of writing interventions may be most beneficial if there is a match between the emotional demands of the intervention and individual differences in emotional approach coping.

Emotional approach coping and adjustment to cancer.

In women with early stage breast cancer who were assessed after primary treatment and followed for 3 months, Stanton et al (2000) found that emotional expression coping was associated with improved self-reported health status, lower psychological distress, fewer medical visits for cancer-related morbidities. In addition, emotional approach coping uniquely predicted these outcomes, over and above the contribution of other coping strategies. The perceived receptivity of the social environment to women's cancer-related expressions was a moderator for the effects of expressive coping on reported improved quality of life - the women who perceived their social contexts as highly receptive reported greater quality of life.

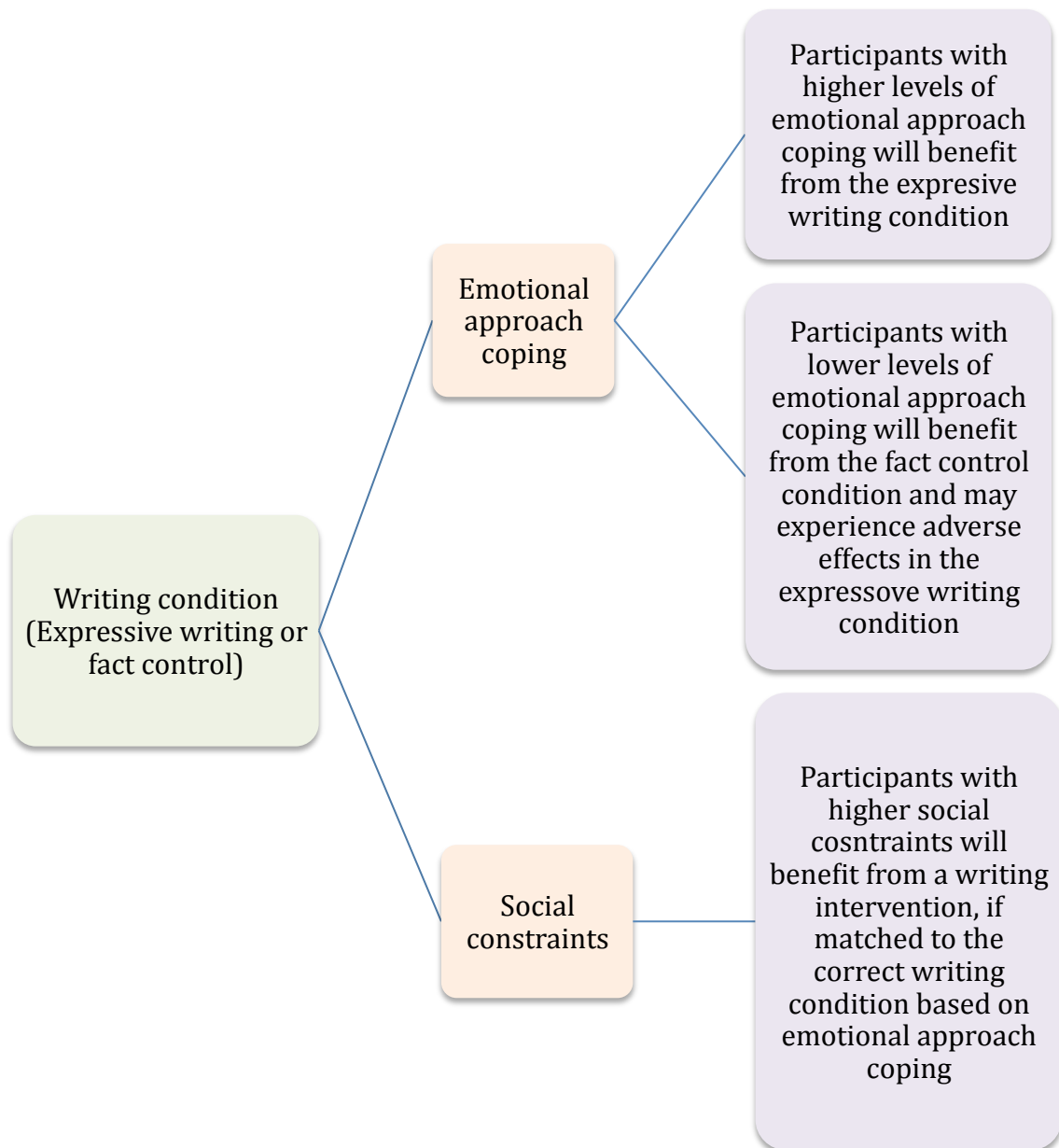
On the other hand, emotional processing was related to greater distress scores over time and was not a significant predictor of health status or medical visits, when emotional expression was controlled for. It appears that the two facets of emotional approach coping may relate differently to cancer-related adjustment outcomes: while emotional expression component appears to be the vehicle for reduced distress, the unique contribution of emotional processing may be related to negative psychological processes, such as rumination that increase psychological distress.

In a previously discussed study with 60 early-stage breast cancer patients post-treatment, Stanton et al (2002) examined cancer-related avoidance as a possible moderator for the observed intervention effects. Due to the emotionally demanding nature

of expressive writing, patients who experience high cancer-related avoidance may actually feel more distressed in a writing condition that asks them to delve deeply into the thoughts and emotions they try to avoid. On the other hand, a positive writing condition may be more fitting for those with high avoidance. Results showed that cancer-related avoidance was significantly related to reported distress in the expressive writing condition at both 1-and 3-months post-writing. Women who participated in the expressive writing condition showed reduced distress at both follow up periods if they scored low on cancer-related avoidance, however, they reported higher distress if they scored high on cancer-related avoidance initially. The effect for women in the positive writing condition was in the opposite direction but marginal in significance. Cancer-related avoidance was not related to reported distress at follow-up in the control fact-writing condition. Such results suggest that the positive effects of both writing conditions may not be universal – women who report low cancer-related avoidance may benefit more from an expressive writing condition, whereas though who report high cancer-related avoidance may benefit more from an alternative writing condition, such as benefit finding. Most importantly, these results suggest that expressive writing may lead to increased distress in some groups of patients, especially those who experience high cancer-related avoidance, as they are asked to face their deepest thoughts and emotions that they try to avoid. The fact that the women high in cancer-related avoidance reported significantly higher distress at 1- and 3-months follow up compared to the control condition suggests that the expressive writing condition may also produce some negative effects for subgroups of participants, while producing positive effects for others. Measures were taken in the current study to inform participants of potential adverse

effects and present them with information on support resources if they experienced distress associated with writing about their cancer experiences. It was also emphasized that participation was entirely voluntary and they could discontinue at any time.

Fig. 1. Summary of predicted interactions based on the matching hypothesis (Niles et al, 2014) and the social-cognitive processing model of adjustment to cancer (Lepore, 2001).



Chapter 3

Statement of the Problem

The literature on psychosocial concerns related to cancer shows that cancer patients are at an increased risk of experiencing psychological distress, such as depression and anxiety, especially soon after their diagnosis (Stanton, 2006). Patients with advanced cancers, such as ovarian, tend to experience greater psychological distress and a variety of physical and psychological symptoms, associated with the cancer, its treatment and the poorer prognosis for survival (Arden-Close, Gidron & Moss-Morris, 2008). New directions in research point to the increased need for psychological interventions to address emotional and psychological concerns related to the cancer experience, especially in patients with advanced cancers, which tend to be underrepresented in psychological research (Stanton, Luecken, MacKinnon & Thompson, 2013). In addition, research is needed to understand the moderators and mechanisms of promising psychological interventions, such as expressive writing, which could be both time- and cost-effective. Expressive writing was first tested with college students who showed improved psychological and physical health outcomes after writing about their deepest thoughts and emotions about a traumatic experience on several brief occasions (Pennebaker & Beall, 1986). Since then, it has been used with a variety of populations, including cancer patients with various diagnoses, but findings remain mixed, although the intervention is generally well-received by participants (Frattaroli, 2006).

Research to date has shown that expressive writing as a brief psychosocial intervention with healthy adults and medical populations produces generally small, positive effects on psychological and physical health outcomes but null and negative

effects have been reported, as well, suggesting the presence of moderating variables (Frattaroli, 2006). The research on expressive writing with cancer patients shows mixed results, with mostly null main effects and some significant moderating effects of variables, such as social constraints and emotional approach coping (Merz, Fox & Malcarne, 2014). More research is still needed to establish for whom and how this intervention works and if it could be contra-indicated for some (Stanton, Luecken, MacKinnon & Thompson, 2013). Given the paucity of research with advanced cancer patients, especially those with ovarian cancer, who experience greater psychological distress and more pronounced physical complaints than many other cancer populations (Arden-Close, Gidron & Moss-Morris, 2008), expressive writing may be a promising, convenient, time- and cost-effective intervention for addressing some of the psychological and emotional concerns related to the cancer experience but its effects in this population need to be examined.

This study tested the moderating effects of social constraints and emotional approach coping, based on a person-environment fit model that suggests that intervention effectiveness likely depends on the match between its demands (such as emotional disclosure) and individual differences, such as coping style and social factors (Niles et al, 2014). The study was based on a cognitive processing model of stressful life events, using expressive writing as an opportunity for disclosure and processing of cancer-related thoughts and emotions. The effects of writing condition and the effects of the moderating variables were predicted based on theoretical models for the role of social constraints on disclosure (Lepore & Revenson, 2007) and the role of emotional approach coping on writing interventions (Niles et al, 2014).

Participants were randomly assigned to one of two writing conditions: expressive writing or a fact control writing. A fact control condition asking participants to write about facts about their cancer has previously been used in expressive writing studies with advanced breast cancer patients (Low, Stanton, Bower & Gyllenhammer, 2010). This control provides face validity and eliminates ethical issues related to presenting advanced cancer patients with mundane topics, as previously used by Pennebaker and Beall (1986) with college students. Presenting both groups with cancer-related writing instructions was believed to increase engagement with writing but it was recognized that both prompts could have been emotionally triggering for participants.

The hypotheses for the current research are outlined below.

Hypotheses

Main effects.

Hypothesis 1a. There will be no main effect of writing condition on emotional well-being at 1-month follow up.

Hypothesis 1b. There will be no main effect of writing condition on quality of life at 1-month follow up.

Hypothesis 1c. Participants in the expressive writing condition will report higher levels of average negative affect post writing sessions as measured by the PANAS (Watson, Clark & Tellegen, 1988) compared to the fact control condition.

Previously reported effect sizes of expressive writing interventions across different samples have been small (Frattaroli, 2006). Main effects with cancer samples have generally been null (Merz, Fox & Malcarne, 2014). Due to the severity of physical symptoms associated with advanced ovarian cancer and increased psychological distress

(Arden-Close, Gidron, Moss-Morris, 2008), it was not expected that a brief writing intervention would produce significant changes in emotional well-being or quality of life one month after the intervention. It was expected that delving into one's emotions about the experience of ovarian cancer would result in increased negative affect post-writing averaged across sessions in the expressive writing condition.

Moderation effects.

Hypothesis 2a. Social constraints and emotional approach coping will moderate the effects of writing condition on emotional well-being at 1-month follow up. Specifically, positive effects of expressive writing on emotional well-being at follow up are expected for participants who report higher levels of social constraints and higher levels of emotional approach coping (a significant 3-way interaction between writing condition, emotional approach coping and social constraints is predicted). The following 2-way interactions are also predicted: Negative effects of expressive writing on emotional well-being at follow up are expected for participants who report lower levels of emotional approach coping, regardless of levels of social constraints; Positive effects of fact control writing on emotional well-being at follow up are expected for participants who report lower levels of emotional approach coping, regardless of levels of social constraints. Writing condition is not expected to affect emotional well-being at follow up but significant effects of emotional approach coping and social constraints are expected.

Hypothesis 2b. Social constraints and emotional approach coping will moderate the effects of writing condition on quality of life at 1-month follow up. Specifically, positive effects of expressive writing on quality of life at follow up are expected for participants who report higher levels of social constraints and higher levels of emotional

approach coping (a significant 3-way interaction between writing condition, emotional approach coping and social constraints is predicted). The following 2-way interactions are also predicted: Negative effects of expressive writing on quality of life at follow up are expected for participants who report lower levels of emotional approach coping, regardless of levels of social constraints; Positive effects of fact control writing on quality of life at follow up are expected for participants who report lower levels of emotional approach coping, regardless of levels of social constraints. Writing condition is not expected to affect quality of life at follow up but significant effects of emotional approach coping and social constraints are expected.

Hypothesis 2c. Emotional approach coping will moderate the effects of writing condition on average negative affect post writing sessions, as measured by the PANAS. Participants with lower levels of emotional approach coping at baseline will report higher levels of average negative affect after expressive writing and lower levels of average negative affect after fact control writing.

Consistent with findings that social constraints and emotional approach coping act as moderators of expressive writing on psychological and health outcomes in cancer samples (Merz, Fox & Malcarne, 2014), both moderators were examined concurrently. Based on Lepore's (2001) model and Niles et al's (2014) findings, it was expected that participants who tend to use emotional approach coping and experience higher levels of social constraints would benefit the most from the expressive writing condition, as it would fit with their preferred coping style and it would also provide an opportunity for disclosure that might not be available to them otherwise due to social constraints. Conversely, participants who endorsed lower levels of emotional approach coping were

expected to benefit more from the fact-control condition, which might be more congruent with their emotional coping style not to process and express emotions.

Moderated mediation effects.

Hypothesis 3a. Higher baseline levels of social constraints will be associated with higher levels of emotional well-being at 1-month follow up in the expressive writing condition by way of reducing cancer-related avoidance for participants who report higher levels of emotional approach coping.

Hypothesis 3b. Higher baseline levels of social constraints will be associated with higher levels of emotional-well being at 1-month follow up in the expressive writing condition by way of reducing cancer-related intrusive thoughts for participants who report higher levels of emotional approach coping.

Hypothesis 3c. Higher levels of social constraints at baseline will be associated with improved quality of life at 1-month follow up in the expressive writing condition by way of reducing cancer-related avoidance for participants who report higher levels of emotional approach coping.

Hypothesis 3d. Higher levels of social constraints at baseline will be associated with improved quality of life at 1-month follow up in the expressive writing condition by way of reducing cancer-related intrusive thoughts for participants who report higher levels of emotional approach coping.

Based on Lepore's (2001) predictions that social constraints cause increased distress by increasing cancer-related avoidance and cancer-related intrusive thoughts, we hypothesized a mediation model that is moderated by emotional approach coping, which is a second moderator of the effects of expressive writing on psychological and physical

outcomes (Niles et al, 2014). Examining the full moderated mediation model would test the theoretical framework proposed by Lepore (2001) combined with Niles et al's (2014) matching hypothesis for the fit between the demands of the intervention and individuals' emotional approach coping tendencies.

Research questions

Research question 1. Are both aspects of emotional approach coping, emotional expression and emotional processing, significant moderators of the effects of the writing conditions?

Research question 2. Do both emotional expression and emotional processing moderate the predicted mediations between social constraints and emotional well-being?

Research question 3. Do both emotional expression and emotional processing moderate the predicted mediations between social constraints and quality of life?

Stanton et al (2000) and Austenfeld and Stanton (2004) suggest that the measure for emotional approach coping can be used as a global score or it can be broken down and analyzed by its two subscales of emotional expression and emotional processing. The authors suggest examining individual subscales when differential effects are expected. There was no prior research to inform whether emotional expression and emotional processing would act differently from each other and from the global measure of emotional approach coping, so their independent effects were examined in the research questions outlined above.

Chapter 4

Methodology

Recruitment

Several avenues for recruitment were used: A study advertisement (see Appendix B) seeking English-speaking women who have had a diagnosis of ovarian cancer was emailed to multiple cancer support groups, organizations and health care providers. The initial recruitment criteria specified that prospective participants must have been diagnosed within the past five years but after the investigator received inquiries from women who were diagnosed more than five years ago and who still expressed interest in participating or for whom the cancer had recurred after an initial diagnosis of more than five years ago, and due to a limited number of participants, the recruitment criteria were expanded to a life-time diagnosis of ovarian cancer.

Recruitment efforts were expanded by posting the study advertisement on social media (Facebook.com), encouraging snowball sampling, and asking colleagues to disseminate the recruitment information. The study was also advertised on ClinicalTrials.gov, a registry of clinical research trials supported by the U.S. National Institutes of Health where prospective participants could search for novel experimental treatments and ongoing research trials. The online advertisements resulted in multiple inquiries for participation but the number of participants remained limited and lower than expected. As a result, other avenues for direct recruitment were sought.

Communication with another researcher who had located participants through a state cancer registry led to this approach next. A cancer registry is a state-maintained database of all new cases of cancer reported for a given time period to the state health

department, which allows protected health information to be used for research purposes. Applications with the cancer state registries of Pennsylvania and Connecticut were submitted, requesting names and mailing addresses of individuals diagnosed with ovarian cancer in the period 2010 – 2015 (later revised to 2012 – 2015 in the application to the PA Department of Health). The application with the CT State Department of Public Health was denied as they refer most such requests to another agency. The application with the PA Department of Health was approved and a list of names and contact information for all cases of ovarian cancer reported to the PA cancer registry for the period 2012 – 2015 was obtained. The list consisted of 2,668 records, some of which were duplicated or contained invalid zip codes. The administrator of this registry noted that records for the most recent years (2014 and 2015) were considered preliminary and subject to change based on further verification of the data. Those were the years used in the current study, as they were likely to include the most women who were still living.

A subset of women from the list provided by the PA cancer registry for the years 2014 and 2015 were mailed an introductory letter, copy of the online consent form, and a brochure for the PA cancer registry, as required. The researchers were only allowed to contact the women through a mailed letter, which then required them to contact the lead researcher via a study-designated email address. Study recruitment materials were mailed to 1,091 prospective participants. The first 991 mailings resulted in a response yield rate of about 2% -3% and many of those mailings (about 20 – 25%) were returned due to no longer existing valid addresses. It is likely that many other letters were not delivered to the named recipient but were not returned to the postal service as being undeliverable.

Due to the low participation rate and high failed delivery rate from the first 991 mailings, another mailing of 100 letters was conducted, for which information on the recipients' current address and living status was first verified using publicly available data. A total of 241 names were reviewed before a subsample of 100 was identified. This process showed that many of the names on the registry list belonged to very elderly women (in their 80's) who were deceased or who appeared to have moved out of their residence most likely due to declining health. In addition, some addresses did not exist as recorded. Names for whom there were online death notices were eliminated. When names and addresses were verified against current public data, more than half the names (58.5%) were eliminated due to not matching current public records. This smaller mailing of 100 resulted in a higher response rate of approximately 12% - 15%. Despite attempts to verify living status and current address, approximately 15% of these mailings were still returned as undeliverable. Ten more of these women contacted the researchers to say that they did not have access to a computer.

All recruitment efforts combined resulted in 74 requests for participation (data on three participants are still being collected). Twenty-seven women specifically mentioned being recruited through the mailed materials, with an estimated 17 additional being recruited that way. Twenty women mentioned only the study reference number from ClinicalTrials.gov, and several mentioned both the mailing and the ClinicalTrials.gov reference number. The exact recruitment yield using a specific strategy is challenging to determine because the study was advertised through multiple avenues over time and some participants likely received information about it in more than one way. Challenges to

recruitment and retention of participants will be discussed in more detail in the Discussion chapter.

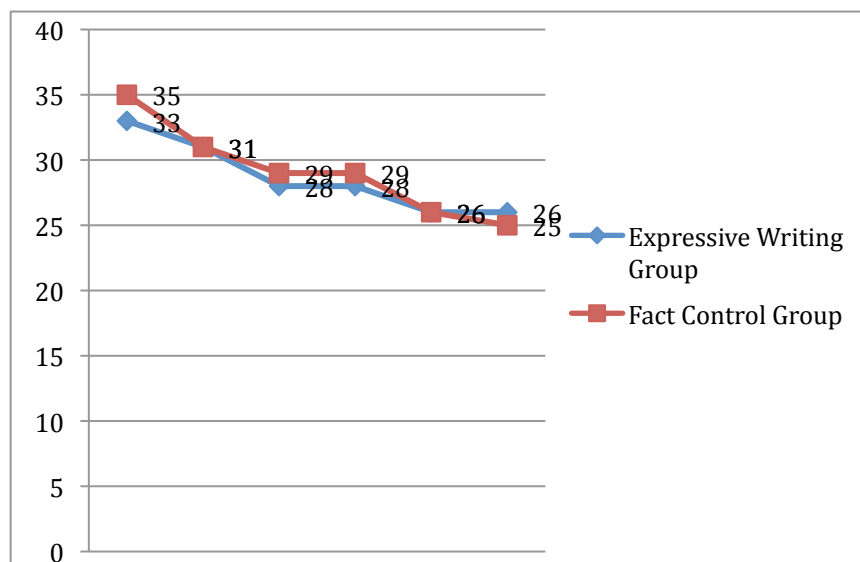
In total, 71 women completed the initial survey, which was comprised of demographic questions, baseline measures on health-related quality of life, social constraints, emotional approach coping, cancer-related avoidance and cancer-related intrusive thoughts, and optimism/pessimism. Survey statistics showed that the initial survey was launched 77 times but one participant clearly started the survey twice, three did not progress enough to provide email addresses and two participants completed only the first half of the initial survey. The sample demographics will be discussed in a separate section below.

Drop out rate.

As noted above, 73 participants provided distinct email addresses that could be used to track their responses. Data on three participants are still being collected, as they began the study at the time the study was about to be closed and they were allowed to continue but they were not included in any of the analyses. Two participants dropped out at the initial survey (2.7%). The remaining drop out rate for the study was estimated to be 25% based on the 68 participants who completed the initial survey and either proceeded with the rest of the study or dropped out after multiple reminders from the researcher. Only women who completed all parts of the initial survey were allowed to continue with the writing tasks. Only women who completed at least three of the writing tasks were contacted with the follow up survey one month after their last writing task. In total, 56 women were sent the follow up survey, of which 53 completed it (94.6%). Two participants who completed the follow up survey (one in each writing condition) were

later eliminated due to completing only two writing tasks but otherwise completing the survey questions associated with the writing tasks. One participant in the fact control condition contacted the researcher to state she was not able to complete the follow up at the time due to health issues and two other participants in the fact control condition did not respond to reminders to complete the follow up survey. A participant in the expressive writing condition requested to withdraw from the study after completing all four writing tasks because she found the writing to be distressing for her (she was not sent a follow up survey). The total number of women who completed all parts of the study was 51, representing 75% of the women who started out by completing the initial survey (excluding the three who are still participating). The drop out rate for each condition is graphed below.

Figure 2. Participant drop out for each writing condition. The numbers on the curves indicate how many participants completed that part of the study at each of the following time points (in order): initial survey, first writing task, second writing task, third writing task, fourth writing task, and follow up survey.



Participants

The average age of the 51 women who completed all parts of the study was 57.96 (SD = 12.08), though participant age ranged from 29 to 83 years and half the sample was over the mean age. Fifty participants were from the USA (one was from Canada), of which 26 were from PA, 6 each were from MD and VA, 2 each were from AZ and OR, and one each from IL, MA, MI, NC, NH, NJ, SC, and TX. One participant (2%) identified as African-American, one (2%) as Hispanic/Latina, three (6%) as “Other”, and 47 (92.2%) as White. Many participants were well educated, with 41.2% holding an advanced degree, 27.5% a bachelor’s degree, 23.5% having completed some college or an associate’s degree and 7.8% having a high school degree. Forty-three percent indicated they were employed full-time, 9.8% were employed part-time, 33.4% were retired, and the rest indicated they were unemployed or on disability. Sixty-seven percent indicated an annual income over \$60,000 and the rest either earned less or preferred not to report. Over half (62.7%) were married or partnered, 29.4% were divorced/widowed or single and the rest did not report on their relationship status. The year of first diagnosis of ovarian cancer ranged from 1981 to 2015, with 64.7% of cases being first diagnosed in 2014 and 2015. Just over half the cases (53%) were first diagnosed at stage III or IV and 13.7% had also been diagnosed with another kind of cancer. Most participants (76.5%) were not in active treatment for ovarian cancer at the time of the study, while 23.5% were. Most (74.5%) indicated that their cancer was in remission, 9.8% that it was recurring, 3.9% that it was progressing, and the rest stated they expected remission or were still in treatment. Five women (9.8%) indicated their cancer recurred in 2015 or 2016. Where

data allowed for between group comparisons, no differences on demographic variables were found between participants who completed the study and those who dropped out.

Measures

Outcome variables.

Emotional well-being and quality of life in persons with ovarian cancer. The two main outcome variables were measured with the Functional Assessment of Cancer Therapy – Ovarian, Version 4 (FACT-O, www.facit.org; Basen-Engquist et al, 2001), which by the authors' report is the first validated quality of life measure specifically for ovarian cancer patients. Using the FACT-O measure for both outcomes has several distinct advantages: First, the scale was developed specifically for individuals who have been diagnosed with ovarian cancer and assesses several aspects of living with ovarian cancer, including functional, social-emotional, and physical well-being, giving a broad range of criteria for quality of life (Basen-Engquist et al, 2001). Second, the measure has been shown to adequately discriminate between individuals with varying levels of somatic symptoms (due to either an advanced stage of the cancer or active treatment), making it appropriate for the present research, which included both women in active treatment and some in remission, as well as women with different stages of cancer at diagnosis. Finally, the measure has been shown to have good reliability and validity estimates. A detailed discussion of the psychometric properties of the measure follow below. For a copy of the measure, please see Appendix D.

Assessing psychological symptoms in cancer patients presents several major challenges: For example, depressive symptoms and depressed mood may be side effects of treatment or the cancer itself, along with somatic symptoms, such as disturbed sleep

and fatigue, also associated with depression or anxiety (Newport & Nemeroff, 1998).

Due to the complexities of cancer symptoms treatment and treatment side effects, latest guidelines emphasize psychological symptoms (feeling sad, lonely, etc.) over somatic symptoms in assessing the psychological well-being of cancer patients (Newport & Nemeroff, 1998).

Many previous studies of expressive writing with healthy and medical populations focused on physical health outcomes, such as reductions in the number of medical visits over time, reduction of physical symptoms, and self-reported health status (Frataroli, 2006). In assessing physical health outcomes with breast cancer patients, Stanton et al (2000) did not find main effects of expressive writing on outcomes such as sleep quality, cancer-related medical visits, self-reported somatic symptoms and health status. This could be due to ceiling effects of medical symptoms in cancer patients, where the intervention was not powerful enough to make a difference in physical outcomes. It was recognized that advanced ovarian cancer and its treatment might produce significant symptoms that may not be susceptible to changes by a brief writing intervention. For this reason, both emotional well-being and quality of life specific to ovarian cancer were examined as main outcomes.

The FACT-O consists of four general subscales (physical well-being, functional well-being, social/family well-being, and emotional well-being) and an ovarian-cancer specific one, for a total of 39 items. The ovarian cancer subscale was developed based on interviews with ovarian cancer patients at different stages of the disease and gynecologic oncology nurses. Reliability and validity of the measure was evaluated with 232 women with a confirmed diagnosis of epithelial ovarian cancer (73% advanced) who were

recruited from an outpatient gynecologic oncology clinic where half of the sample was receiving active treatment and the other half was seen for cancer surveillance but did not have evidence of a current disease (Basen-Engquist et al, 2001). The internal consistency reliability of individual subscales ranged from 0.74 to 0.88 and was 0.92 for the entire measure. Test-retest reliability ranged from 0.72 to 0.88 for individual subscales and was 0.81 for the entire measure. In the present study, the internal consistency reliability for the entire measure was .93 at baseline and .95 at follow up. The internal consistency reliability for the Emotional Well-being Subscale was .83 at baseline and .87 at follow up.

The measure and its subscales also evidenced good convergent and divergent validity, correlating as expected with other measures of quality of life for cancer patients, physical symptoms, anxiety, depression, and family environment. Significant correlations were observed between the emotional well-being subscale and social desirability, as well as between the total measure and social desirability, which accounting for less than 10% of shared variance. This could be due to the fact that most participants filled out the baseline questionnaires in the clinic; when follow-up questionnaires were filled out in participants' homes, only the emotional well-being subscale retained a significant correlation with social desirability.

Results also showed that the FACT-O measure could adequately discriminate between patients with different levels of somatic symptoms, due to either an advanced cancer stage or active treatment. Higher symptoms correlated with poorer quality of life across various domains. The measure was also sensitive to changes in patients' self-reported health status over time, detecting improved, stable or worsened well-being based on the progress of the cancer. The authors noted that most items on the ovarian cancer

subscale tend to have positively skewed responses and possible ceiling effects. The item inquiring about childbearing concerns may apply to a small percentage of women with ovarian cancer, as the mean age at cancer diagnosis tends to past childbearing age.

Overall, the ovarian cancer subscale and the measure as a whole have demonstrated good internal consistency, reliability and validity, as well as sensitivity to change and health status. To our knowledge, this is the only ovarian cancer-specific measure of various dimensions of quality of life, including emotional well-being, that has been developed and validated with cancer patients.

Moderators.

Emotional approach coping. Emotional approach coping was measured by an 8-item Emotional Approach Coping scale (EAC; Stanton, Kirk, Cameron, & Danoff-Burg, 2000), with two subscales for emotional expression and emotional processing, which could be used independently or as a total score (Appendix D). In the current study, the total score for emotional approach coping was used. The scale was developed and validated with college student samples but it has since been used with cancer samples, as well (Stanton & Low, 2012). With regards to convergent and discriminant validity, emotional processing and expression were found to be distinct from other types of coping but moderately correlated with approach coping strategies, as expected (Stanton, Danoff-Burg, Cameron, & Ellis, 1994). Findings also showed that the subscales are either uncorrelated or negatively correlated with avoidance coping strategies.

In both dispositional and situational versions, the EAC scales demonstrate high internal consistency reliability, ranging from 0.72 to .94, and a 4-week test-retest reliability of $r = 0.72$ to $r = 0.78$. When used with breast cancer patients, internal

consistency reliability was 0.80 for the emotional processing scale and 0.93 for the emotional expression scale (Stanton et al, 2000). The two scales have been found to be moderately to highly inter-correlated (Stanton et al, 2000). Discriminant, convergent and predictive validity was evaluated with regards to different adjustment outcomes and coping and was reported to be good in a variety of samples (Austenfeld & Stanton, 2004). In the present study, the internal consistency reliability was .94 for the entire scale, .92 for the emotional processing subscale and .94 for the emotional expression subscale.

Social constraints. Social constraints represent social conditions or the perception thereof that lead trauma survivors to feel inhibited in expressing trauma-related thoughts and emotions to others (Lepore, 2003). In the present study, social constraints were examined as a moderator of the effects of writing condition on emotional well-being and quality of life outcomes. Lepore (2003) developed a 15-item measure on social constraints about cancer, based on an earlier social constraints measure with bereaved parents, a pilot study with cancer patients who identified positive and negative aspects on talking about their cancer with close others, and a literature review on failed social support. Predictive and discriminant validity tests showed that social constraints correlated positively with worsened mental health and negative affect. Due to considerations for participant burden, the 15-item Social Constraints Scale (Lepore, 2003) specifically developed for cancer was not used in the current study, as initially intended. Instead, a 5-item version based on the original scale developed for bereaved mothers (Lepore, Silver, Wortman & Wayment, 1996) was adapted for the current study to refer to perceived social constraints by others in relation to the experience of ovarian cancer (see Appendix D). The internal consistency reliability of that modified 5-item

scale was .65. Prior internal consistency reliability estimates for the modified version of the social constraints scale used in the current research are unavailable but the longer 15-item version had internal consistency reliability of 0.88 for social constraints with regard to spouse and 0.90 with regard to friends and family at 3-months post-diagnosis in a sample of 96 women with early stage breast or colon cancer (Lepore, 2003).

Mediators.

Cancer related avoidance and cancer related intrusive thoughts. Cancer related avoidance and cancer related intrusive thoughts were measured by the two subscales of The Impact of Events Scale (IES; Wilner & Alvarez, 1979), see (Appendix D), which was developed to assess subjective reactions to traumatic events, in this case the experience of ovarian cancer. It includes 15 items with two subscales measuring avoidance of distressing stimuli and intrusive thoughts over the past 7 days. Based on the theory of cognitive adaptation (Horowitz, 1986), both avoidance of traumatic stimuli and intrusive thoughts are indicative of unprocessed traumatic material, and thus can be used as an indirect measure of cognitive processing, as suggested by Lepore (2001). Identifying normative data for this measure is difficult due to differences in sample characteristics and differences in the time since the referenced traumatic event occurred for the studies that have used this instrument (Sundin & Horowitz, 2002). However, the measure has been shown to have good reliability and validity in various populations, including cancer patients, with a factor structure that remains stable with regard to different types of traumatic events (Sundin & Horowitz, 2002). In the current research, internal consistency reliability was .82 for the Intrusion subscale and .77 for the Avoidance subscale, which were used separately.

Other measures.

Positive and negative affect. Positive and negative affect before and after each writing session was measured using the Positive and Negative Affect Schedule (PANAS; Watson, Clark & Tellegen, 1988), see (Appendix D). A measure of positive and negative affect before and after each writing session was used to obtain information about the effect of writing condition on participants' mood. PANAS (Watson, Clark & Tellegen, 1988) is a 20-item measure of positive (10 items) and negative (10 items) affect that could be used with reference to various time points. The instrument was initially developed and validated with college students, with the two subscales having shown high internal consistency reliability ($r > 0.85$), small negative inter-correlations, and test-retest reliability of 0.54 (positive affect scale) and 0.45 (negative affect scale) when completed with reference to the present moment (Watson, Clark & Tellegen, 1988). Since its initial development, this measure has been used with a variety of populations and has been revised to different lengths (Watson & Clark, 1994). In the present study, the positive and negative affect subscales demonstrated internal consistency reliability above .70 (and higher) across the multiple administrations of the measure.

Procedure

Participants were instructed to contact the researchers via a study-designated email address listed in the recruitment materials in order to receive a link to the online consent form and the initial survey containing demographic questions and baseline measures. An online randomizer was used to generate a random series of 1s and 2s, which was used to assign participants to the expressive writing condition (1) or the fact-control condition (2), based on the order in which their responses to the initial survey

were recorded. Participants were asked to use the same email address for all parts of the study in order to link their responses to different portions of the study.

Participants in the expressive writing condition were instructed to write about their deepest thoughts and emotions about ovarian cancer (see Appendix C), whereas those in the fact control condition were asked to write about facts about their cancer (see Appendix C). Such a design has already been used in a number of studies with cancer patients and eliminates the ethical concerns about asking advanced cancer patients to write about trivial topics.

The entire study consisted of an initial survey with demographic questions and baseline measures (15 min), followed by four 15-minute writing tasks and additional measures (20 – 25 min total) scheduled to take place at 3-day intervals and a follow up survey (10 min) sent one month after the last writing task (see Appendix D for study measures). Reminders about missed writing entries were sent out up to three times if the writing task was not completed within the prescribed 3-day interval. Before and after each writing task, participants were asked to complete a brief 20-item measure of their current positive and negative affect (PANAS; Watson, Clark & Tellegen, 1988). At the end of the last writing session, data on all outcome, moderator, and mediator variables were collected and participants were asked about their reactions to participation in this experiment. Data collection was conducted with utmost efforts to preserve confidentiality (a university endorsed survey platform was used, email correspondence with participants was kept separate from survey responses and individual responses were only linked to an email address). For a detailed schedule of events and session measures, please see Table 1A in Appendix A.

Data collection.

Data were collected using an online platform for survey administration and communication with participants was maintained via email. Though great efforts were made to implement the study protocol as accurately as possible (4 writing tasks followed by the follow-up measures one month later), several instances of issues with data collection were noted. Of the 51 participants who comprised the final sample, two participants in the expressive writing condition and one participant in the fact control condition mistakenly completed five writing tasks because of redoing a writing task. Additionally, one participant in each writing condition completed only 3 writings tasks due to technical issues in one case and a wish to discontinue writing in another. The follow up survey was mistakenly sent 11 days earlier than scheduled to one participant in the expressive writing condition and she completed it immediately. In addition, five participants in the expressive writing condition completed the follow up survey 8-12 days later and four participants in the fact-control condition completed it 6 - 9 days later (most participants responded within 1 - 4 days). Other researchers have reported variations in time to complete the writing tasks and the completion of follow-up measures. Because these variations were similar across the two conditions, all of these participants described above were retained in the sample.

Power

The initially proposed sample was 60 – 120 participants, with a goal to recruit at least 100 (50 per condition). Due to the low response rate despite significant efforts to reach prospective participants and a drop out rate of approximately 25%, the final sample size was 51 participants (26 in the expressive writing condition and 25 in the fact control

condition).

A power analysis using G*Power 3 software for computing a-priori power (Faul, Erdfelder, Lang and Buchner, 2007) showed that a hierarchical multiple regression analysis with seven predictors (to account for all main predictors and interaction terms) would require a sample size of 132 to detect a small effect $f^2 = 0.1$ with power of 0.95 and alpha level of 0.05. A power analysis for the statistical significance of the full multiple regression model with all seven predictors for one outcome, assuming a medium effect size of the model, alpha of 0.05, and power of 0.8, revealed that a sample size of 103 would be needed. Reducing the power to 0.7 resulted in a sample size of 86.

Of note, the small effect size $r = .08$ reported by Frattaroli (2006), which would equal $R^2 = .016$, nearly ten times less than $f^2 = 0.1$, is the unique contribution of expressive writing across a variety of samples and does not necessarily represent the effect of the entire model. To detect such a small effect, assuming it would be similar for the current study, a sample size of 640 for alpha of 0.05 and power of 0.8 would be needed. Reducing the power to 0.7 while keeping alpha at 0.05 decreases the needed sample size to 504. Those calculations hold for a single multiple regression analysis, not taking into account the reduced alpha level needed to correct for experiment-wise Type I error when conducting multiple analyses. While ideal, such sample sizes are unrealistic to gather in many regards and the limitations due to the small sample size of the current study are addressed in the Discussion chapter.

Statistical analyses

The main moderation analyses were based on a discussion by West, Aiken and Krull (1996) about the advantages of analyzing interactions between continuous and

categorical variables using a multiple regression approach (moderated multiple regression) rather than traditional analysis of variance (ANOVA). Using a moderated multiple regression analysis was particularly fitting for the two-group experimental design of the current study with hypothesized moderation effects of two continuous variables (emotional approach coping and social constraints) and one categorical variable (writing condition).

West, Aiken and Krull (1996) recommend that the first-order effects and two-way interactions of all predictors involved in a three-way interaction be included in the regression model, just like in a complete factorial ANOVA model. The categorical variable (writing condition or W) can be dummy-coded (0 = fact-control condition, 1 = expressive writing condition), such that the expressive writing condition is compared to the fact-control condition in interpreting the results of the multiple regression analysis. Including the continuous predictors emotional approach coping (EAC) and social constraints (SC) results in the following regression equation:

$$Y = b_0 + b_1(W) + b_2(EAC) + b_3(SC) + b_4(W)(EAC) + b_5(W)(SC) + b_6(EAC)(SC) + b_7(W)(EAC)(SC)$$

The regression equation for the fact-control condition, after substituting $W = 0$, becomes:

$$(1) Y = b_0 + b_2(EAC) + b_3(SC) + b_6(EAC)(SC)$$

Similarly, the regression equation for the expressive writing condition, after substituting

$W = 1$, is:

$$(2) Y = b_0 + b_1 + b_2(EAC) + b_3(SC) + b_4(EAC) + b_5(SC) + b_6(EAC)(SC) + b_7(EAC)(SC) = (b_0 + b_1) + (b_2 + b_4) (EAC) + (b_3 + b_5) (SC) + (b_6 + b_7)(EAC)(SC)$$

The predicted value of the outcome variable in the fact-control condition equals the mean of that group (control condition). The predicted value of the outcome variable in the expressive writing condition represents the difference in the value of the expressive writing group mean and the control group mean.

Using unstandardized regression coefficients allows one to directly interpret the results of the regression equation, where each regression coefficient represents the regression of the dependent variable on a specific predictor at the value of 0 on all other predictors. Thus, regression coefficients in complex models with interactions are considered conditional effects that hold only at specific values of other predictors in the equation. Following West, Aiken and Krull's (1996) recommendations, the continuous variables were centered to reduce multicollinearity. Results were interpreted for the mean of those variables, rather than 0, which may have little or no meaning for many psychological scales (i.e. hardly is the absolute absence of a measured construct meaningful).

Chapter 5

Results

Initial Analyses

For the final sample of 51 participants who completed all parts of the study, independent-samples t-tests showed significant baseline differences between the two writing conditions on quality of life scores, and for two of the 5 subscale scores of the FACT-O measure (social well being and ovarian cancer specific symptoms). Participants in the expressive writing condition as compared to participants in the fact control condition reported significantly higher quality of life scores at baseline (mean = + 12.26 points, $t = 2.30$, $p = 0.03$), higher social well being scores (mean = +3.12 point, $t = 2.30$, $p = 0.03$), and higher scores (mean = +3.56, $t = 2.57$, $p = 0.01$) on the Additional Concerns subscale (ovarian cancer specific). No significant baseline differences between the two writing conditions were detected for emotional well-being, emotional approach coping, social constraints, or intrusion of events scores (and the two subscales of emotional approach coping and intrusion of events scales). No significant baseline differences between the two writing conditions were detected for age of participants. Please see Table 1E in Appendix E for the results of all group analyses.

Main effects

Hypothesis 1a. There will be no main effect of writing condition on emotional well-being at 1-month follow up.

Previous research on expressive writing with cancer samples has reported mostly null main effects of writing condition on physical and psychological outcomes and has suggested that future researchers focus on examining moderator effects (Merz, Fox &

Malcarne, 2014). Based on previous findings and the likelihood that significant cancer-related symptoms would not be impacted by a brief writing intervention, main effects of writing condition on emotional well-being and quality of life at follow up were not predicted.

Contrary to predicted, a one-way ANCOVA, $F(1,47) = 7.23$, $p = 0.01$, $\eta^2 = .13$, medium effect, demonstrated statistically significant differences in emotional well-being at follow up between the two writing conditions, controlling for emotional well-being at baseline. Participants in the expressive writing condition reported an increase of 2.58 points in emotional well-being (indicating improved or higher well-being) at follow up compared to participants in the fact-control condition. The analysis was performed on data from 50 participants (25 in each group), after a significant outlier was identified in the process of assumptions checking for the test and removed from this analysis. For details on the results from the one-way ANCOVA and assumptions checking for the test, see Tables 2E and 3E in Appendix E.

Hypothesis 1b. There will be no main effect of writing condition on quality of life at 1-month follow up.

A one-way ANCOVA, $F(1, 48) = 1.02$, $p = .32$, $\eta^2 = .02$, demonstrated no statistically significant differences in quality of life at follow up between the two writing conditions, controlling for baseline quality of life. For details on the results from the one-way ANCOVA and assumptions checking for the test, see Tables 4E and 5E in Appendix E.

***Hypothesis 1c.* Participants in the expressive writing condition will report higher levels of average negative affect post writing sessions as measured by the PANAS (Watson, Clark & Tellegen, 1988) compared to the fact control condition.**

Diagnostic analyses revealed that the data violated the assumption of normality for an independent-samples t-test, necessitating a non-parametric test. A Mann-Whitney U test demonstrated that there were no significant differences in negative affect after writing ($p > .05$). Negative affect scores post writing sessions were summed across writing sessions and an average was calculated, based on the number of sessions after which participants filled out the measure. The average score for negative affect post writing across sessions was used as an outcome variable.

Missing values were not counted towards subscale scores and a final score was not computed if more than half the measure was not completed. This approach was adopted because it appeared that in some cases, participants skipped over items in the scale as if to avoid reporting on a specific emotion. In other cases, multiple items in a row were skipped (for example, skipping the entire second half of the measure). In cases where less than half of the items were omitted (typically few were omitted for any given participant), imputation methods for replacing missing data as described by Schlomer, Bauman and Card (2010) were not deemed adequate because substituted values might not accurately represent how participants felt at the moment given the high subjectivity of the measure, especially if items were skipped to avoid reporting on specific emotions. Because some participants made a decision not to report on every emotion probed by PANAS, the omitted items were assigned a score of zero and not included in computation of the final scores. It is recognized that this strategy is imperfect because it may introduce

a bias towards minimizing the affect scores.

A cut-off score of missing 50% or more of the items was selected to delete cases from the analysis. As noted by Schlomer, Bauman and Card (2010), there does not exist a consensus in the field on selecting a cut-off percentage of missing items for deleting cases. Because the scale contained 10 positive and 10 negative affect items, the researcher felt that computed scores would not be valid if half or more of the items were omitted (there was no case where only the positive or only the negative items were skipped). Of note, no case was excluded based on a missing average negative affect score but in few instances, the average affect score post-writing was based on two or three negative affect scores, instead of the expected four. For some, this was due to completing only three writing tasks. For those who completed five writing tasks, the first four computed negative affect scores were used to calculate the average. The majority of participants provided complete data on the measure.

Moderation effects

Hypothesis 2a. Social constraints and emotional approach coping will moderate the effects of writing condition on emotional well being at 1-month follow up. Specifically, positive effects of expressive writing on emotional well-being at follow up are expected for participants who report higher levels of social constraints and higher levels of emotional approach coping (a significant 3-way interaction between writing condition, emotional approach coping and social constraints is predicted). The following 2-way interactions are also predicted: Negative effects of expressive writing on emotional well being at follow up are expected for participants who report lower levels of emotional approach coping, regardless of levels of social

constraints; Positive effects of fact control writing on emotional well being at follow up are expected for participants who report lower levels of emotional approach coping, regardless of levels of social constraints. Writing condition is not expected to affect emotional well being at follow up but significant effects of emotional approach coping and social constraints are expected.

Regression diagnostics revealed that the data violated the assumption for homoscedasticity of residuals necessitating a weighted least squares regression approach. In addition, one significant outlier (standard deviation greater than 3SD) and one high leverage and high influence point were detected (both in the expressive writing condition). Regression analyses run with and without the two outliers showed that the model fit was slightly better when the outliers were excluded but the differences in coefficients between the two models were not large and it appeared that the outliers did not affect the overall model by a lot. As a result, the outliers were kept in the final analysis described below.

A weighted least squares regression showed that social constraints and emotional approach coping did not moderate the effects of writing condition on emotional well-being at follow up. Writing condition ($b = 2.00$, $SE = 0.89$, $p = .03$) and social constraints ($b = -2.47$, $SE = .70$, $p < 0.01$) were the only significant predictors in the model without interaction terms and with writing condition, social constraints and emotional approach coping as predictors, $R^2 = .37$, $F(3, 47) = 9.12$, $p < 0.01$; adjusted $R^2 = .33$. See Tables 6E and 7E in Appendix E for more details on model fit and coefficients.

***Hypothesis 2b.* Social constraints and emotional approach coping will moderate the effects of writing condition on quality of life at 1-month follow up. Specifically, positive effects of expressive writing on quality of life at follow up are expected for participants who report higher levels of social constraints and higher levels of emotional approach coping (a significant 3-way interaction between writing condition, emotional approach coping and social constraints is predicted). The following 2-way interactions are also predicted: Negative effects of expressive writing on quality of life at follow up are expected for participants who report lower levels of emotional approach coping, regardless of levels of social constraints; Positive effects of fact control writing on quality of life at follow up are expected for participants who report lower levels of emotional approach coping, regardless of levels of social constraints. Writing condition is not expected to affect quality of life at follow up but significant effects of emotional approach coping and social constraints are expected.**

Since baseline differences in quality of life (FACT-O total scores) between the two writing conditions were found, initial FACT-O total scores were included as a covariate (Block 1) in a hierarchical regression model with emotional approach coping (centered), social constraints (centered), and writing condition as main predictors in Block 2, all their 2-way interactions in Block 3, and 3-way interaction in Block 4.

Regression diagnostics detected one outlier with a studentized deleted residual greater than 3SD (same as the outlier point detected for the regression model for emotional well being at follow up) and one high leverage point (same as the high leverage point detected for the regression model for emotional well being at follow up).

Given the negative influence of outliers and high leverage points on model fit and regression coefficients, the identified significant outliers were excluded from the analysis.

Results showed that the full model with the covariate, all main predictors and all interaction terms was not statistically significant ($p > 0.05$), see Tables 8E in Appendix 9E for details). The model with the covariate, all main predictors and all 2-way interactions was marginally significant ($R^2 = .84$, F change (3,41) = 2.18, $p = 0.11$, adjusted $R^2 = .82$). In that model, the coefficients for social constraints ($b = 10.95$, $SE = 4.77$, $p = .03$) and the interaction between social constraints and writing condition ($b = -11.97$, $SE = 5.63$, $p = .04$) were statistically significant. Results showed that emotional approach coping did not moderate the effect of writing condition on quality of life at follow up. In this marginally significant model given the small sample size ($p = 0.11$), with the covariate, all main predictors and all 2-way interactions, social constraints both statistically significantly predicted quality of life at follow up and moderated the effects of writing condition on quality of life at follow up.

From Table 9E in Appendix E, the equations predicting quality of life at follow up for the two writing groups are:

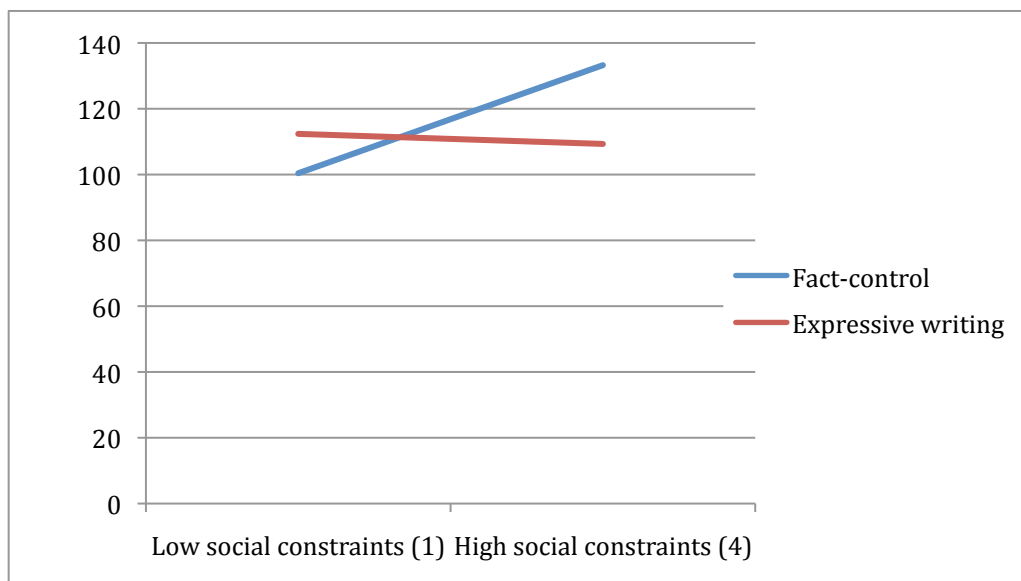
$$\text{FACT-O}_{(\text{fact-control})} = -8.31 + 1.03 (\text{FACT-O}_{\text{initial}}) + 10.95 (\text{SocialConstraints}_{\text{initial}})$$

$$\text{FACT-O}_{(\text{expressive writing})} = -8.31 + 1.03 (\text{FACT-O}_{\text{initial}}) - 1.02 (\text{SocialConstraints}_{\text{initial}})$$

As can be seen from the above equations, a 1-point increase in social constraints results in a 10.95-point increase in quality of life at follow up for participants in the fact-control condition, compared with a 1.02-point decrease in quality of life at follow up for participants in the expressive writing condition, provided initial levels of quality of life are controlled for. A 1-point decrease in social constraints has the opposite effect for each

condition. The equations above are based on the mean-centered values for social constraints, measured on a 1-4 points scale. Given that the sample mean of social constraints score was 2.08 (SD = .53), social constraints scores could only decrease by 1 point and increase by 2 to reach the end points of the scale. Thus, 1 would represent the lowest social constraints and 4 the highest, which are the values used to graph the interaction effect below.

Figure 3. The effect of the interaction between social constraints and writing condition on quality of life at follow up. The two different lines show the different effects of social constraints in each writing condition. The value of the covariate (baseline quality of life) was set at 116.17 points, which equaled the sample mean. One point represents low social constraints and 4 points represent high social constraints (those are the two end values of the social constraints scale).



***Hypothesis 2c.* Emotional approach coping will moderate the effects of writing condition on average negative affect post writing sessions, as measured by the PANAS. Participants with lower levels of emotional approach coping at baseline will report higher levels of average negative affect after expressive writing and lower levels of average negative affect after fact control writing.**

A hierarchical linear regression with average negative affect post writing sessions as a dependent variable, and writing condition, emotional approach coping, and the interaction between writing condition and emotional approach coping as predictors showed that there was no significant interaction effect between emotional approach coping and writing condition on average negative affect post writing sessions (see Table 10E in Appendix E for details.)

Mediation Effects

It was previously established that emotional approach coping was not a significant predictor of emotional well-being at follow up or quality of life at follow up and it did not interact with writing condition or social constraints to affect the outcomes (see results from hypotheses 2a and 2b). As a result the initially proposed moderated mediation hypotheses were not tested and the study likely lacked sufficient power to detect such effects, if present. Instead, tests for simple mediation effects of cancer-related avoidance and cancer-related intrusive thoughts on the relationships between social constraints and emotional well-being at follow up and social constraints and quality of life at follow up were conducted. The four analyses below reflect the tests of those mediation effects.

***Hypothesis 3a.* Higher baseline levels of social constraints will be associated with higher levels of emotional well-being at 1-month follow up in the expressive**

writing condition by way of reducing cancer-related avoidance for participants who report higher levels of emotional approach coping.

Following Baron and Kenny's (1986) model for evaluating mediation, first it was established that social constraints significantly predicted emotional well-being ($p < .01$). Then, it was established that social constraints was significantly correlated with cancer-related avoidance ($p < .01$). When testing the effects of both social constraints and cancer-related avoidance on emotional well being at follow up, none of the predictors remained significant ($p > .05$), not supporting a mediation model, which would require that the effect of the mediator (cancer-related avoidance) remain significant when the causal variable (social constraints) is controlled for.

Hypothesis 3b. Higher baseline levels of social constraints will be associated with higher levels of emotional well-being at 1-month follow up in the expressive writing condition by way of reducing cancer-related intrusive thoughts for participants who report higher levels of emotional approach coping.

Following Baron and Kenny's (1986) model for evaluating mediation, first it was established that social constraints significantly predicted emotional well-being ($p < .01$). Then, it was established that social constraints is significantly correlated with cancer-related intrusive thoughts ($p < .01$). When testing the effects of both social constraints and cancer-related intrusive thoughts on emotional well being at follow up, the statistical significance of the effect of social constraints disappeared and the value of its coefficient decreased, while the effect of cancer-related intrusive thoughts remained significant ($p < .01$). Support for the mediation effect of cancer-related intrusive thoughts was established.

Hypothesis 3c. Higher levels of social constraints at baseline will be associated with improved quality of life at 1-month follow up in the expressive writing condition by way of reducing cancer related avoidance for participants who report higher levels of emotional approach coping.

Following Baron and Kenny's (1986) model for evaluating mediation, first it was established that social constraints significantly predicted quality of life at follow up ($p < .01$). Then, it was established that social constraints was significantly correlated with cancer-related avoidance ($p < .01$). When testing the effects of both social constraints and cancer-related avoidance on quality of life at follow up, none of the predictors remained significant ($p > .05$), not supporting a mediation model, which would require that the effect of the mediator (cancer-related avoidance) remain significant when the causal variable (social constraints) is controlled for.

Hypothesis 3d. Higher levels of social constraints at baseline will be associated with improved quality of life at 1-month follow up in the expressive writing condition by way of reducing cancer-related intrusive thoughts for participants who report higher levels of emotional approach coping.

Following Baron and Kenny's (1986) model for evaluating mediation, first it was established that social constraints significantly predicted quality of life at follow up ($p < .01$). Then, it was established that social constraints is significantly correlated with cancer-related intrusive thoughts ($p < .01$). When testing the effects of both social constraints and cancer-related intrusive thoughts on quality of life at follow up, the statistical significance of effects of social constraints and cancer-related intrusive thoughts became marginally significant ($p = .08$). This did not provide conclusive support

for the mediation effect for cancer-related intrusive thoughts.

Research questions

Research question 1. Are both aspects of emotional approach coping, emotional expression and emotional processing, significant moderators of the effects of the writing conditions?

Emotional expression and emotional processing were not found to moderate the effects of writing condition on quality of life at follow up, controlling for baseline quality of life. Similarly, emotional expression and emotional processing were not found to moderate the effects of writing condition on emotional well-being at follow up.

Research question 2. Do both emotional expression and emotional processing moderate the predicted mediations between social constraints and emotional well-being?

Research question 3. Do both emotional expression and emotional processing moderate the predicted mediations between social constraints and quality of life?

These research questions were not tested because they were not well formulated as proposed and they did not specify the exact relationship to be tested. In addition, no effects of emotional expression or emotional processing were expected given previous findings reported above. When emotional expression and emotional processing were included as predictors in regression models, along with social constraints and writing condition and all 2-way interactions, neither emotional expression nor emotional processing were found to be significant predictors of emotional well being at follow up or quality of life at follow up and neither interacted with social constraints or writing condition. Thus, there was no moderated effect between emotional expression/emotional

processing and social constraints to examine. Finally, it would be difficult to find indirect effects through moderated mediation with the small sample size of the current study, thus the above research questions were no longer considered and post-hoc analyses were examined instead.

Post-hoc analyses

Do average positive and average negative affect post writing sessions predict emotional well being at 1-month follow up, in addition to writing condition? Do average positive and average negative affect post writing sessions interact with writing condition to predict emotional well being at 1-month follow up?

A hierarchical multiple regression model was run with writing condition, average positive affect post writing sessions, average negative writing post writing sessions as main predictors (Block 1) and the interactions between average positive affect post writing sessions and writing condition, and average negative affect post writing sessions and writing condition (Block 2) to predict emotional well-being at follow up.

The full regression model was statistically significant $R^2 = .61$, $F(5, 45) = 14.14$, $p < .01$, adjusted $R^2 = .57$. Writing condition, average positive affect post-writing, average negative writing post-writing and the interaction between average negative writing post-writing and writing condition added statistically significantly to the prediction. For coefficients and standard errors see Tables 11E and 12E in Appendix E.

The results show that both average positive and average negative affect post writing sessions contribute significantly to the prediction and there is a significant interaction between average negative affect post writing sessions and writing condition, such that participants in the expressive writing condition reported an additional decline of

0.48 points in emotional well-being for each 1-point increase in average negative affect post writing sessions compared with participants in the fact-control condition. As can be seen from the coefficients in Table 12E a 1-point increase in average positive affect post writing sessions corresponded to a 0.23-point increase in emotional well-being at follow up. For participants in the fact-control condition, a 1-point increase in average negative affect post writing sessions lead to a 0.24-point decrease in emotional well-being at follow up. For participants in the expressive writing condition, a 1-point increase in average negative affect post writing sessions lead to a 0.72-point decrease in emotional well being at follow up.

What is the relationship between average positive affect post writing sessions and average negative affect post writing sessions and other predictor variables and outcomes?

The correlations between average positive affect post writing sessions and average negative affect post writing sessions and emotional approach coping, emotional processing, emotional expression, social constraints, total Intrusion of Events Scale score (IES, Horowitz, Wilner & Alvarez, 1979), IES subscale score for cancer-related intrusive thoughts, IES subscale score for cancer-related avoidance, and writing condition were examined. The average positive and negative affect post writing sessions scores were not significantly correlated with emotional approach coping, emotional processing, emotional expression or writing condition. Both positive and negative affect post writing sessions were significantly correlated with the remaining variables.

Next, it was examined whether average negative affect post writing sessions mediated the relationships between social constraints and the main outcome variables

(emotional well-being at follow up and quality of life at follow up). There was support for the proposed mediation effect of average negative affect post writing sessions on both relationships (following Barron and Kenny's (1986) procedures for assessing mediation). This means that for participants experiencing higher baseline levels of social constraints, which would suggest more limited opportunities to discuss and process cancer-related experiences with others, writing about their experiences with ovarian cancer is more distressing, and may cause decreased quality of life and emotional well-being at follow up.

Summary of findings

In summary, participants in the expressive writing condition reported increased emotional well-being at follow up when controlling for baseline levels of emotional well-being but there were no differences in quality of life at follow up between the two writing conditions, controlling for baseline quality of life. Contrary to predictions, there were no differences in reported average negative affect post writing sessions between the two writing conditions and emotional approach coping did not interact with writing condition to predict average negative affect post writing sessions. Post-hoc analyses showed that average positive affect post writing sessions had a positive effect on emotional well-being at follow up, whereas average negative affect post writing sessions had a negative effect, which was larger for the expressive writing condition.

In a model with all main predictors included, the expressive writing condition had a positive and significant effect on emotional well-being at follow up, while social constraints had a significantly negative effect and emotional approach coping had no effect. The hypothesized moderation effects between emotional approach coping, social

constraints and writing condition in predicting emotional well-being at follow up were not detected and support for the matching hypothesis proposed by Niles et al (2014) was not found.

In a marginally significant model, social constraints had a significant effect and interacted with writing condition to predict quality of life at follow up, such that participants with high baseline levels of social constraints benefited more from the fact control condition, while participants with low baseline levels of social constraints benefitted more from the expressive writing condition. The observed interaction effect was contrary to predicted.

Finally, cancer-related intrusive thoughts mediated the effect of social constraints on emotional well-being at follow up but not on quality of life at follow up. Cancer-related avoidance was not found to mediate the effect of social constraints on either emotional well-being at follow up or quality of life at follow up. In addition, post-hoc analyses revealed that average negative affect post writing sessions mediated the effects of social constraints on both emotional well-being at follow up and quality of life at follow up.

Chapter 6

Discussion

A randomized controlled experiment was conducted investigating the effects of two brief writing interventions (expressive writing and fact-control writing, both focused on experiences with ovarian cancer) on emotional well-being and quality of life one month after writing in women who have been diagnosed with ovarian cancer. In addition, the moderation effects of emotional approach coping and social constraints were examined, which have been discussed in previous theory and research as significant moderator variables of the effects of expressive writing on physical and emotional outcomes. Mediation effects of cancer-related avoidance and cancer-related intrusive thoughts were also examined, based on a cognitive processing framework of understanding stressful life experiences.

Based on previous limited research examining moderators of expressive writing in persons with cancer, it was hypothesized that both emotional approach coping and social constraints would moderate the effects of writing condition on emotional well-being at follow up and quality of life at follow up. In other words, characteristics of the participants would interact with the writing condition they were assigned to in order to predict outcomes. Main effects of writing condition on emotional well-being at follow up and quality of life at follow up were not predicted based on limited previous research because of expected significant symptoms and elevated psychological distress associated with a diagnosis of ovarian cancer that would likely persist for many participants after a brief writing intervention. However, some treatment effects were predicted in that it was hypothesized that participants in the expressive writing condition would report higher

levels of negative affect after writing compared with participants in the fact control condition. It was also expected that cancer-related avoidance and cancer-related intrusive thoughts would be reduced in the expressive writing condition for participants with higher levels of social constraints and higher levels of emotional approach coping. Several research questions related to aspects of emotional approach coping (emotional processing and emotional expression) were also examined and post-hoc analyses were conducted on other significant associations. In this chapter, findings related to the proposed hypotheses, research questions, and post-hoc analyses are discussed along with limitations of the study, and implications for future research.

Initial analyses

Despite random assignment following a strict protocol that used a randomly generated computer series to assign participants to conditions, independent-samples t-tests revealed baseline differences in reported quality of life, social well-being, and additional concerns specific to ovarian cancer. There were no significant baseline differences in emotional well-being between the two conditions and differences on physical and functional well-being subscales were marginally significant. The mean sample baseline scores on the FACT-O measure that was used to assess different dimensions of quality of life (physical well-being, social well-being, emotional well-being, functional well-being, and additional concerns specific to ovarian cancer) were compared to reference norms provided in the scoring interpretation manual for the measure (obtained from www.facit.org). The sample means for this study fell between scores for healthy functioning and scores that indicated some limitations in functioning

due to the cancer (more details will be presented in the discussion on clinical significance of effects).

Main effects

Main effects of writing condition on emotional well-being and quality of life at follow up were not predicted due to previously reported mostly null effects of expressive writing on physical and psychological outcomes with cancer samples (Merz, Fox & Malcarne, 2014; Stanton et al, 2002; Low et al, 2010; Zachariae & O'Toole, 2015). Contrary to predictions, there was a significant positive effect of expressive writing on emotional well-being at follow up, controlling for baseline levels of emotional well-being. Participants in the expressive writing condition reported an average increase of 2.58 points (on a 0-24 point scale) in emotional well being at follow up compared with participants in the fact-control condition ($p = .01$, $\eta^2 = .13$). The clinical significance of this finding is discussed in the next section. The observed medium effect size is larger than what Frattaroli (2006) previously found as an overall r -effect size of 0.075 for expressive writing interventions, with an average effect size of $r = 0.056$ for psychological health outcomes. It should be noted that the effect size produced by the ANCOVA analysis, the partial eta squared, accounts for both shared and error variance in the outcome, unlike the r -effect which represents the unique contribution of a given predictor and is based on shared variance. Frattaroli (2006) noted variability in effect sizes by different domains of psychological functioning, with the largest effect size for distress ($r = .102$, small), second largest for depression ($r = .073$, small), and smallest for positive functioning ($r = .045$, small).

The observed positive effect of the expressive writing condition on emotional well-being at follow up supports previous findings that this intervention across many types of samples is largely beneficial for participants. Frattaroli (2006) reported positive effects of expressive writing in 70% of the studies reviewed in her meta-analysis, negative effects in 25%, and null effects in 5%. As initially hypothesized by Pennebaker and Beall (1986), expressive writing is proposed to be beneficial for emotional well-being because it is thought to facilitate the processing of emotionally traumatic experiences, though many studies with cancer patients have failed to replicate the significant main effects reported in healthy samples (Merz, Fox & Malcarne, 2014; Zachariae & O'Toole, 2015). From a cognitive processing perspective, expressive writing is thought to help integrate thoughts and emotions about traumatic experiences, promoting a more coherent narrative of the experience and as a result, improved psychological health (Pennebaker & Seagal, 1999).

Is the observed positive effect of expressive writing on emotional well-being at follow up clinically meaningful?

To understand clinically meaningful differences in FACT-O scores, the criterion variable performance status rating (PSR) used to assess sensitivity to clinical change in the development and validation of the FACT-O measure will be briefly reviewed. PSR is a widely used tool for quantifying cancer patients' functional status and the degree to which symptoms affect physical activity and mobility (Sorensen, Klee, Palshof, and Hansen, 1993). A PSR score of 0 means normal activity, PSR of 1 means some symptoms but still nearly full ambulatory functioning, PSR of 2 means less than 50% of day time spent in bed, PSR of 3 means more than 50% of day time spent of bed and PSR of 4 means fully bedridden (Sorensen, Klee, Palshof, and Hansen, 1993). Performance

status rating was not assessed in the present study but the referenced norms provide a context for understanding the findings. They show that what appear to be small changes in scores reflect clinically meaningful changes in functioning.

The FACT-O interpretation and scoring manual provides a reference table for clinically meaningful difference scores between groups with PSR of 0, 1, and 2 or 3, which are based on previous research using FACT-O, Version 3. To compare scores from FACT-O, Version 3, which is a 38-item instrument preceding FACT-O, Version 4, used in the current study, some computational adjustments were made according to the guidelines provided in the manual. One question from the Emotional Well-Being subscale that was new to Version 4 was excluded (*I worry that my condition will get worse*) from the subscale and total scores and the mean from a subscale not present in Version 4 was added to the total score.

The revised emotional well-being subscale scores had a mean of 16.21 (SD = 3.0) at baseline and 16.2 (SD = 3.2) at follow up in the current sample for all participants combined. As a comparison in assessing emotional well-being scores, the FACT-O scoring and administration manual reports a mean of 20.2 (SD = 3.1) for persons with performance status rating (PSR) of 0, a mean of 16.7 (SD = 5.2) for PSR of 1, and a mean of 17.0 (SD = 5.5) for PSR of 2 or 3, with higher PSR scores representing more limited functioning and higher emotional well-being scores representing higher levels of emotional well-being. A difference of 3.5 points on the Emotional Well-Being subscale differentiates between groups with PSR of 0 and 1, and -0.3 points differentiates groups with PSR of 1 and PSR of 2 or 3. The current sample mean on emotional well-being at both baseline and follow up most resembled groups with PSR of 1 or lower functioning.

Only approximately 25% of the sample reported emotional well being scores of 18 or higher at both baseline and follow up.

A mean difference of 2.58 points on emotional well-being at follow up as observed between the two writing conditions equals 0.81 of the standard deviation for follow up scores and could be clinically meaningful in distinguishing between a PSR of 1 (some symptoms but with nearly full mobility) and PSR of 2 or 3 (spending a significant amount of day time in bed). In addition, it is close to the difference of 3.2 points needed to distinguish between scores indicating normal activity and limited activity.

The positive effect of expressive writing on emotional well-being at follow up may have clinical implications for both individuals who have been diagnosed with ovarian cancer and their caregivers in providing a brief, cost-effective and easy to implement intervention for addressing some of the emotional challenges that women living with ovarian cancer experience. To our knowledge, this is the first study to report a significant effect of expressive writing on emotional well-being in women diagnosed with ovarian cancer. The results from the present study could contribute to inform future research and add to a small but growing body of literature on expressive writing with ovarian cancer patients. The lack of significant interactions between emotional approach coping and writing condition also challenges the generalizability of the matching hypothesis to women diagnosed with ovarian cancer and the notion that expressive writing could be contra-indicated for individuals with lower levels of emotional approach coping (which was not supported by the current findings).

No significant effect of writing condition on quality of life at follow up.

As predicted, there was no effect of writing condition on quality of life at follow up, controlling for baseline quality of life. Quality of life was assessed by FACT-O total scores, which were composed of all subscale scores (physical well being, social well-being, emotional well-being, functional well-being and ovarian cancer specific concerns). Thus, the outcome quality of life encompassed a much broader spectrum of functioning that included both physical and social-emotional dimensions. It is not surprising then that a brief writing intervention may lack the power to change aspects of quality of life that may be of more intractable nature, such as pronounced physical symptoms, limited work capacity, and other prolonged or permanent changes that may be associated with ovarian cancer and its treatment.

In studies with cancer samples, there have been mostly null effects of writing condition on physical and psychological outcomes which many researchers concluded was due to the role of moderators and mediators being most important in predicting treatment effects, though some significant positive treatment effects of expressive writing have been reported with breast cancer patients (Merz, Fox & Malcarne, 2014). Research conducted by Stanton et al (2002) on early stage breast cancer patients and Low, Stanton, Bower and Gyllenhammer (2010) on metastatic breast cancer patients found no main effects of expressive writing on physical or psychological outcomes one month after writing. In general, very few studies have also used expressive writing with gynecological cancer patients. Arden-Close, Gidron & Moss-Morris (2013) found no main effects of writing condition on either physical or psychological outcomes with ovarian cancer patients and their partners.

The sample mean quality of life score fell between normative scores corresponding to a PSR of 0 (normal functioning) and PSR of 1 (some symptoms). Overall, the current sample means for quality of life at baseline and follow up is close to that of individuals with normal functioning. Only 19.6% of the sample at baseline and 31.4 % at follow up reported a quality of life score which would be lower than the mean score corresponding to a PSR of 1 (some symptoms but mostly normal functioning). Of note, baseline quality of life scores were significantly higher in the expressive writing condition despite random assignment. Even though analyses on quality of life at follow up controlled for baseline quality of life, baseline differences could not be eliminated and it is unclear whether a larger sample with random assignment would have resulted in no such differences.

Evidently, the sample mean in the present study for quality of life scores at both baseline and follow up were closer to healthy functioning than were the mean scores for emotional well-being. It is possible that women who participated in the study were already at a higher overall level of functioning with fewer mobility restrictions (as many had survived beyond the initial time frame when many have passed away or are experiencing significant effects that might preclude them from participating) but were experiencing lower than optimal emotional well-being perhaps because of concerns about prognosis and cancer recurrence. As a result, significant effects of writing condition may have been observed on emotional well-being scores at follow up but not on quality of life scores at follow up. As measured by FACT-O, quality of life is a much broader concept and includes many physical and cancer-specific symptoms, which may not be impacted by a brief writing intervention.

It is also possible that women who had more pronounced emotional symptoms or were more attuned to their psychological distress sought out participation in the current study. A number of participants shared in their communication with the researcher that they were looking for opportunities to write about or express their struggles with ovarian cancer. Many of the expressive writing entries contained reflections on significant issues, such as coming to terms with the prospect of dying, negotiating family relationships in the context of a health crisis and processing losses of employment, identity and social roles (e.g. “I had to stop working of course and this devastated me”; “I hate what ovarian cancer has done to me and my family. This horrible cancer has destroyed my physical beauty and tries to steal my happiness”). Thus, emotional well-being may have been an outcome that would be affected by a brief writing intervention, especially if participants were already eager to process significant emotional struggles, for which the expressive writing condition gave more opportunity.

Average negative affect post writing sessions.

While expressive writing may be a distressing experience in the moment because participants are asked to delve deeply into their deepest thoughts and emotions about a traumatic event, results showed that there were no significant differences in average negative affect post writing sessions between the two writing conditions. Both writing conditions could have been emotionally triggering, as in both participants were asked to write about their experiences with ovarian cancer. A quick perusal of participants’ writing entries revealed that many women in the fact-control condition still wrote about their distressing feelings about ovarian cancer. The “true” control condition in the original expressive writing paradigm asked participants to write about a trivial topic that was

completely unrelated to a traumatic experience (Pennebaker & Beall, 1986). However, this strategy would appear to lack face validity in research with cancer populations and may pose ethical concerns about the use of individuals' time in cases where advanced disease may have significantly shortened the life expectancy of participants. Thus, researchers have adapted the writing prompt to focus on facts about the disease and the expressive writing prompt to elicit writing about one's deepest thoughts and feelings about the cancer (Stanton et al, 2002). Writing about cancer-related experiences regarding a disease that typically involves an invasive and difficult treatment and a high rate of mortality may have been emotionally distressing in both conditions and may have reduced or eliminated expected differences in negative affect post-writing.

Results also showed that emotional approach coping did not interact with writing condition to influence average negative affect post writing sessions, as predicted. Thus, differences in emotional approach coping may not account for how participants feel immediately after writing about their cancer, even though the matching hypothesis proposed by Niles et al (2014) would suggest that the emotional demands of the writing intervention should fit the resources available to the individual for best results. Specifically, participants lower on emotional approach coping were expected to report higher average negative affect post writing sessions if they were assigned to the expressive writing condition, which would have been a poor match for their preferred coping style. It is possible that individuals lower on emotional approach coping simply engaged with the writing tasks at a more superficial level, which would need to be examined by content analysis of their responses. Although most expressive writing studies do not include a content analysis of writing entries, a separate research undertaking focused on content analysis of the writing entries could show

whether the writing prompts were successful in eliciting distinct writing responses in the two conditions and whether participants followed closely the directions presented to them. Pennebaker and colleagues have developed a text analysis program called Linguistic Inquiry and Word Count (LIWC) that can be used for analyzing the frequency of positive, negative and causal words in writing (Tausczik & Pennebaker, 2010), although examining specific words out of the context of the sentence may be limited or misleading. Future research may benefit from better rubrics/coding systems for analyzing the content of writings and examining compliance with treatment instructions.

Moderation effects

Despite previously reported significant moderators and the variability of overall effect sizes for expressive writing interventions when considering studies with a range of participants (from $r = -.291$ to $r = .592$ as reported by Frattaroli (2006)) and the call in the literature to move beyond treatment effects to examining moderation and mediation (Stanton, Luecken, MacKinnon & Thompson, 2013), analyses from the current study did not detect the hypothesized moderation effects of social constraints and emotional approach coping or the hypothesized 3-way interaction between writing condition, emotional approach coping and social constraints. One of the questions that need to be addressed when considering the lack of significant moderation effects in this study is that of power. As discussed earlier, this study likely lacked sufficient power to detect small effects. However, lack of power alone may not explain the absence of significant moderation, especially when it comes to emotional approach coping, which is discussed in the next section.

Lack of significant effects for emotional approach coping.

Despite theoretical predictions, the results from the present study showed that emotional approach coping was not a significant predictor of either emotional well-being at follow up or quality of life at follow up and did not interact with either social constraints or writing condition to affect the outcomes. In addition, neither aspects of emotional approach coping (emotional processing and emotional expression) affected the outcomes or interacted significantly with social constraints or writing condition. Thus, support for the hypotheses that emotional approach coping or its two components (emotional processing and emotional expression) would moderate the effects of writing condition on emotional well-being and quality of life at follow up and would also interact with social constraints to affect the outcomes was not found.

The matching hypothesis proposed by Niles et al (2014) predicts that the effectiveness of writing interventions would depend on the fit between the emotional demands of the intervention and individuals' emotional coping style. The matching hypothesis has been based partly on findings with healthy adults (Austenfeld, Paolo & Stanton, 2006; Niles et al, 2014), though research with early stage breast cancer participants demonstrated that emotional expression coping was positively associated with physical and psychological outcomes and interacted with perceived social support to modify the effects of expressive writing on reported quality of life (Stanton et al, 2000). Stanton et al (2000) also found that emotional approach coping uniquely predicted health and psychological outcomes. Results from the current study did not support predictions based on the matching hypothesis and diagnostic analyses showed that emotional approach coping was not significantly correlated with the outcome measures, as it would have been expected. It

could be that the generalizability of the matching hypothesis is limited or that more extensive research is needed to determine the effects of coping style on writing interventions with individuals with advanced life-threatening cancers.

Effects of social constraints on emotional well-being at follow up.

It was predicted that social constraints would interact with writing condition and emotional approach coping to affect emotional well-being at follow up and quality of life at follow up. Contrary to predictions, social constraints did not interact with writing condition or emotional approach coping in predicting emotional well-being at follow up. The lack of significant interactions may have been due to lack of power to detect such interactions or lack of an actual effect. Zakowski et al (2004) found a buffering effect of expressive writing on psychological distress at follow up only for participants high in social constraints in a mixed sample with prostate and gynecological cancer. No such effect was detected for participants with low social constraints. The present study did not find such a moderation effect of social constraints on writing condition in predicting emotional well-being at follow up. As previously discussed, there was no support for a matching hypothesis (Niles et al, 2014) and no main effect of emotional approach coping on emotional well-being at follow up in the present study, suggesting that emotional approach coping did not affect the proposed relationships.

Even though moderation effects were not detected, significant main effects were found. In a model with social constraints, writing condition, and emotional approach coping as predictors, both social constraints and writing condition significantly predicted emotional well-being at follow up. Consistent with predictions made by Lepore (2001) and in line with previous research findings by Zakowski et al (2004), social constraints had a significant

negative effect on emotional well-being at follow up and a 1-point increase in social constraints resulted in a 2.47-point decrease in emotional well being at follow up. The interpretation of these results is based on sample mean-centered values of social constraints, which are measured on a 4-point scale in response to how often various social constraints are experienced and the responses to the five items in the measure are then averaged (1 = Never, 4 = Often). Thus, a 1-point increase in social constraints represents 1 point over the sample mean of 2.08 (SD = .53). Based on the previously discussed clinically meaningful differences in emotional well-being scores, a decrease of 2.47 points could differentiate between emotional well-being scores corresponding to different levels of functioning (see discussion above). In this model, expressive writing contributed 2.00 points to emotional well-being at follow up, consistent with earlier findings in this study.

Effects of social constraints on quality of life at follow up.

Social constraints were found to both uniquely predict quality of life at follow up and to moderate the effect of writing condition on quality of life at follow up, though the overall model was marginally significant ($p = .11$). Despite the marginal significance of the overall model, this finding is discussed in more detail next, given the small sample size and the need to inform future research.

The interaction effect showed that participants high in social constraints benefited more from the fact-control condition, whereas participants low in social constraints benefited more from the expressive writing condition. Increased social constraints indicated participants experienced fewer opportunities to share and process their experiences with ovarian cancer with others. The interaction effect observed in the current study was contrary to predicted and contrary to findings from Zakowski et al (2004). The study by Zakowski et

al (2004) differed from the present research by using a neutral control condition and assessing the effects of writing on psychological distress at follow up in a mixed sample of 104 participants with prostate (50) and gynecological (54) cancers (including 14 with ovarian cancer). Thus the comparison of the effect of the emotional disclosure condition in both studies is limited. It could be that participants with fewer opportunities to discuss their cancer experiences (higher social constraints) benefitted from writing about the facts of their disease because writing about their deepest thoughts and emotions may be too distressing to process without a supportive social environment. In contrast, participants with low social constraints may have already been accustomed to sharing their cancer-related experiences with others and they may have made use of the expressive writing condition more effectively or they could continue to process what they wrote about with others in their lives.

As previously discussed, writing about the facts of one's experiences with cancer is potentially emotionally triggering and while it may not represent a "true" control condition, it may have "dose-related" emotional intensity effects on the outcomes. In addition, participants with higher social constraints may benefit from the fact-control condition in their quality of life at follow up because quality of life is a broader construct than emotional well-being and may be affected differently by writing about facts vs. emotions. The quality of life measure used in the present research has several subscales that include physical, social, functional, and ovarian-cancer specific well-being, in addition to emotional well-being. Writing about cancer-related facts may positively affect dimensions other than emotional well-being for participants higher in social constraints, as it may prompt better understanding of the disease and its treatment. With the caveat that these were findings from a marginally significant overall model, the two writing conditions appear to have different

effects on emotional well-being and quality of life at follow up based on baseline levels of social constraints.

Mediation effects on emotional well-being and quality of life at follow up

It was hypothesized that cancer-related intrusive thoughts and cancer-related avoidance would mediate the effects of social constraints on emotional well-being at follow up and quality of life at follow up. As proposed by Lepore's (2001) social-cognitive processing model of adjustment to cancer, cancer-related intrusive thoughts mediated the effect of social constraints on emotional well-being at follow up. There was marginal support for the mediation effect on quality of life at follow up, as the p-value approached significance but did not reach a value of .05, though the effect may have been found with a larger sample. The mediating role of cancer-related intrusive thoughts on the relationship between social constraints and emotional well-being at follow up can be explained by the social-cognitive processing theory of adjustment to cancer (Lepore, 2001), which proposes that the receptiveness of the social environment to disclosing and processing cancer experiences influences the distressing effect of cancer-related related intrusive thoughts on psychological health. In a supportive social environment, such thoughts lose their distressing effect even if they are not reduced in frequency.

There was no support for the mediating role of cancer-related avoidance on the relationship between social constraints and either outcome. One possible explanation for the lack of the hypothesized mediating effect of cancer-related avoidance may be participant self-selection for the current study. While advertising materials did not mention details about the two writing conditions, the study was specifically advertised as writing about experiences with ovarian cancer. This may have prompted a self-selection bias in the

recruitment, such that prospective participants who were high on cancer-related avoidance did not choose to enroll.

Post-hoc analyses

Post-hoc analyses were conducted to further clarify the role of average positive and average negative affect post writing sessions on emotional well-being at follow-up. Post-hoc analyses revealed that both average positive and average negative affect post writing sessions significantly predicted emotional well-being at follow up. In addition, average negative affect post writing sessions interacted with writing condition to result in decreased emotional well-being, which was greater for participants in the expressive writing condition, compared with the fact control condition. While an increase in reported average negative affect post writing sessions led to a subsequent decrease in emotional well-being for both writing conditions (with a greater decrease in the expressive writing condition), higher reported average positive affect post writing sessions led to an increase in emotional well-being at follow up. Of note, the changes were less than one point each. Authors have previously reported that expressive writing is often distressing immediately after writing, though it may result in health and psychological benefits in the long run (Pennebaker, 2004). Current findings showed that average negative affect post writing sessions and average positive affect post writing sessions had different and opposite effects on emotional well-being at follow up and increases in average negative affect post writing session influenced subsequent emotional well being negatively.

One might suppose that reported affect post-writing might be related to individuals' emotional coping style and that the observed effects on emotional well-being at follow up may be due to differences in how individuals cope with their emotions

through approach or avoidance. Surprisingly, neither average positive affect nor average negative affect post writing sessions were significantly correlated with emotional approach coping scores or subscale scores for emotional processing and emotional expression. However, there were significant correlations between affect scores and social constraints, with the highest correlation being between average negative affect post writing sessions and social constraints. Mediation analyses showed that average negative affect post writing sessions mediated the relationships between social constraints and both emotional well-being at follow up and quality of life at follow up. Thus, the negative affect triggered by the writing tasks may be at least partly due to the ability to process cancer related experiences in supportive social environments. It would be important for additional research to examine this relationship.

Study limitations

Despite some significant findings, the current research remains limited in several areas. Most notably, the study likely lacked enough power to detect possible moderation effects due to a smaller-than-expected sample size. With regards to sample size, the present study, like many others examining non-convenience samples may be underpowered due to significant challenges in recruiting and retaining participants. Power analyses revealed that to detect a very small effect size in a full regression model with the three main predictors (writing condition, emotional approach coping and social constraints) and all four interaction terms for one outcome, one might need more than 500 participants, depending on the pre-determined alpha and power levels. Conducting multiple analyses as was needed in the current study further decreased power because of experiment-wise Type I error. Despite the limited likelihood of detecting small effects

due to a small sample size, it could not be known in advance whether some medium effects might be found, given the paucity of research on ovarian cancer. The prevalence of expressive writing studies on breast cancer is likely due to the relative ease of obtaining adequate samples.

Barriers to recruitment were one of the biggest challenges to ensuring an adequate sample size. Despite significant efforts to reach potential participants, the response rate was low and drop out rate was relatively high (about 25%). Some of the challenges were recruiting and retaining participants despite significant efforts to reach by mail 1,091 prospective participants who had been diagnosed with ovarian cancer in the past two years and many more through online advertisements and snowball sampling. The first mailing to 991 individuals resulted in a low response rate (2-3%) and a return rate of mailings due to no longer valid addresses of nearly 20%. It is likely that more mailings were not delivered to the intended recipient due to death, relocation or lack of forwarding address. A second mailing of 100 was conducted, for which contact information provided by the cancer state registry was checked against current public records. This process showed that over 50% of the mailing addresses were no longer current and many of the individuals on the list were already deceased. This population is often characterized by fragile health, older age, and a high death rate. In the current study, the mean age of participants was 57.96 years (SD = 12.08) though it ranged from 29 to 83 and half the sample was 59 or older. Some prospective participants contacted the researcher to request paper-and-pencil measures, as they did not have access to a computer or the internet, which excluded them from participating in an online-based study.

The lack of research on cancers with lower rates of occurrence and higher mortality rates has led to significant gaps in the literature. Thus, power requirements have to be balanced with the need to further knowledge on understudied populations in areas with challenges to recruiting and retaining participants. In addition, findings from underpowered studies could still be valuable in future meta-analyses and contribute to better understanding of research questions posed across multiple studies. While it is recognized that the current study likely lacked sufficient power to detect small effect sizes, it is also believed that it has valuable contributions to the small body of research on expressive writing with women who have been diagnosed with ovarian cancer.

In addition to negotiating limitations to recruitment, research on writing interventions with individuals with advanced cancer needs to also balance the face validity of time-consuming interventions with experimental design considerations. Participants in both the expressive writing and fact-control conditions wrote about ovarian cancer-related material and one could argue that writing about the facts of ovarian cancer treatment and post-treatment effects also elicited emotions and might not have been as powerful of a control condition as a neutral condition. A quick perusal of participant entries revealed that some participants elaborated on their emotions about ovarian cancer in the fact control condition. Examining numeric variables only limits the understanding of the effect of writing content on psychological and health outcomes. A content analysis of the writing entries using computerized tools or reliable coding systems would supplement current findings in better understanding how the process of writing about facts or thoughts and emotions about cancer experiences affects well-being and health.

Finally, the present study was limited with regards to representation of diverse ethnic and racial backgrounds (92% of the sample was White), lower income levels and lower educational experiences. In addition, the vast majority of participants indicated that they were in remission and not in active treatment, suggesting that women whose prognosis was worse and who were likely more distressed were more difficult to reach and engage in participation. It is likely that the recruitment efforts were not uniformly successful for all segments of the population living with ovarian cancer.

Future directions

Despite significant challenges to recruitment and retention of participants, research on advanced cancer populations is highly needed and should be continued. Some findings of this study are promising and more efforts should be directed towards testing and developing effective psychosocial interventions for persons diagnosed with an advanced cancer. Even though initial investment in carrying out such research may be high (costs, labor intensive, time consuming), long-term returns may outweigh the costs. New directions clearly call for testing for the mechanisms of effectiveness of promising interventions, such as expressive writing, and assessing new theories to explain them, such as the matching hypothesis proposed by Niles et al (2014). Even though this study did not find evidence for that theory, power limitations may have precluded discovering a small but significant interaction effect.

To increase the likelihood of detecting significant effects, this study was designed based on Frattaroli's (2006) extensive meta-analytic findings about optimal conditions for detected effect sizes in expressive writing research. They included three or more writing sessions of at least 15 min each, writing in the privacy of one's home and writing about

more recent events. Most participants were able to complete all four writing sessions but in cases where one session was missed, participants who completed 3 writing sessions could still take the final outcomes measures without concerns that the number of their writing sessions may negatively impact the effect of condition. The goal was to have participants complete all writing sessions in a period of 2 weeks but there was some variability in the time period in which participants completed the study and not everyone adhered to the prescribed timeline. Frattaroli's (2006) findings show that the spacing of writing sessions did not affect outcomes.

In addition, this study used a measure specifically designed and validated for assessing several domains of quality of life in individuals with ovarian cancer that was shown to be sensitive to change in functional status and had good psychometric properties. The measure with lowest internal consistency reliability of .65 used in the study was a 5-item scale of social constraints modified for this study based on a previous study with bereaved mothers. The modification was necessary to reduce the time and effort demanded of participants in completing multiple questions. Researchers need to carefully consider the length of instruments used with participants who often report increased fatigue and worsened concentration and continued development and validation of brief but psychometrically sound measures is needed.

Finding better ways to reach the relatively few women diagnosed annually in the US with ovarian cancer would be important. Unlike common cancers such as breast cancer where one might be able to develop connections to treatment centers, the relatively low number of women diagnosed with ovarian cancer means that few are treated at any one site. Mailed requests to prospective participants identified through a

cancer state registry produced a very low response rate. If the request reached the recipient and they were open to participating in the study, it required the participant to reach out to the researcher via email rather than to click on a link leading directly to the study, which could have been burdensome for some and excluded those who did not have access to a computer.

Modifications to the writing interventions could also produce improved retention of participants. For example, the writing sessions could be limited to 3 instead of 4 and instructions could be altered to help participants engage deeper with the writing tasks. One could also use a waitlist control and two treatments to further examine the effects of each writing condition. It also be advisable to reduce participant burden by limiting the study measures administered along with writing tasks and implement follow up less than one month after writing to assess short-term outcomes and consider a longer-term follow up to assess longer lasting effects.

Summary

Despite a smaller-than-expected sample size and limited power, findings from the current research showed that expressive writing had a positive effect on emotional-well being at follow up in a sample of 51 women who have been diagnosed with ovarian cancer. Expressive writing did not affect quality of life at follow up, which may have been too broad of an outcome to be impacted by a brief writing intervention. There were no differences in reported average negative affect post writing sessions between expressive writing and fact-control writing, though it was predicted that expressive writing would be more distressing. Hypothesized moderations effects of emotional approach coping based on a matching hypothesis for a fit between intervention demands

and individual resources (Niles et al, 2014) were not found. Consistent with theory and previous findings, social constraints had negative effects on both emotional well-being and quality of life at follow up, though the hypothesized interactions between social constraints, emotional approach coping and writing condition were not found. In a marginally significant model predicting quality of life at follow up, social constraints interacted with writing condition such that participants with high levels of social constraints benefitted more from the fact-control condition and participants with low levels of social constraints benefitted more from the expressive writing condition. This was contrary to predicted and showed that writing condition may affect quality of life at follow up differently based on individual differences in social constraints. It was also found that cancer-related intrusive thoughts mediated the effects of social constraints on emotional well-being at follow up, shedding light on a possible mechanism of how social constraints may affect health and psychological outcomes. Finally, post-hoc analyses revealed that average positive and average negative affect post writing sessions affect emotional well-being at follow up differently:

This research contributes to the limited literature on brief writing interventions (specifically expressive writing) with women with ovarian cancer in several important ways: It set out to examine the moderating effects of emotional approach coping and social constraints based on theoretical models and previous empirical findings. Even though not all predictions were supported, it provided an examination of new and important considerations of writing interventions that focus on understanding the role of individual differences and the mechanisms through which they impact the effects of writing on psychological and health outcomes. In addition, it sheds light on some of the

challenges encountered in recruiting individuals with a diagnosis of advanced cancer and advocates for researchers to focus on continued efforts to conduct ecologically valid studies with non-convenience sample in areas of highest need, as is the case with brief psychosocial interventions for advanced cancer populations. Finally, despite reported limitations, current findings will hopefully allow for future meta-analytic reviews to probe with greater power in the questions could not be addressed by single studies.

Appendix A. Timeline

Table 1A. Schedule of events

<p>Day 1 Baseline measures (15 min)</p>	<p>Demographic questionnaire Functional Assessment of Cancer - Ovarian Emotional Approach Coping Scale Social Constraints Scale Impact of Events Scale, Cancer specific Life Orientation Test, Revised (LOT-R)</p>
<p>Day 3 Writing Session 1 (22 min)</p>	<p>PANAS-X Writing condition (20 min) PANAS-X</p>
<p>Day 6 Writing Session 2 (22 min)</p>	<p>PANAS-X Writing task 2 (15 min) PANAS-X Subjective evaluation of writing task Emotional Approach Coping Scale (EAC) Social Constraints Scale Impact of Events Scale, Cancer specific FACT-O: Emotional well-being, Social/Family well-being; Functional well-being</p>
<p>Day 9 Writing Session 3 (22 min)</p>	<p>PANAS-X Writing condition (20 min) PANAS-X</p>
<p>Day 12 Writing Session 4 (30 min)</p>	<p>PANAS-X Writing condition (20 min) PANAS-X Functional Assessment of Cancer - Ovarian Emotional Approach Coping Scale Social Constraints Scale Impact of Events Scale, Cancer specific Reactions to participation</p>
<p>Day 42 Follow-up (1 month after last writing session), 10 min</p>	<p>Functional Assessment of Cancer - Ovarian Emotional Approach Coping Scale Social Constraints Scale Impact of Events Scale, Cancer specific Life Orientation Test, Revised (LOT-R)</p>

Appendix B. Recruitment Materials

1. Study Advertisement

Writing about Ovarian Cancer

Have you been diagnosed with ovarian cancer? We want to understand women's experience with ovarian cancer, which is understudied compared with more common cancers such as breast cancer. We are investigating the effects of writing about ovarian cancer and we invite you to participate in a **confidential online study**. You are eligible to participate if you are **at least 18 years old, English-speaking** (without geographical restrictions), and have had a **diagnosis of ovarian cancer**. To participate, you will need internet access and a current email address. You will be asked to complete a set of initial questions (15 min), followed by writing about your experience with ovarian cancer on four occasions (20 - 25 min each), over the course of two weeks. We will contact you one month after your last writing for a final set of follow-up questions (10 minutes). The total estimated time for participation is approximately 120 min over 7 – 9 weeks (most tasks can be completed within the first 3 weeks). Your participation is entirely voluntary and it can be discontinued at any time. This research is being conducted by Ana Popovska, M.A., Doctoral Candidate, and Dr. Mary Ann Hoffman, Professor, at the University of Maryland, College Park and it has received IRB approval. If you have any questions, you can contact us at WritingStudyUMD@gmail.com. *If you know others who may be eligible to participate, please share this information with them.*

2. Message sent after completing the baseline survey:

Thank you for participating in our study **Writing about Ovarian Cancer**, conducted by Ana Popovska, M.A., Doctoral Candidate, and Dr. Mary Ann Hoffman, Professor, at the University of Maryland, College Park. In a few days, you will receive a link to your first writing task. Please remember to use **the same** email address for all parts of the study. If you have any questions, you can contact us at WritingStudyUMD@gmail.com.

3. Email with study link to writing tasks:

Your new writing task

Thank you for participating in our study **Writing about Ovarian Cancer**, conducted by Ana Popovska, M.A., Doctoral Candidate, and Dr. Mary Ann Hoffman, Professor, at the University of Maryland, College Park. We are sending you a link to your new writing task. Please complete it **within the next 3 days, if possible**. We strongly recommend that you find a private and comfortable setting without any interruptions for the next 20 min. If you have questions, do not hesitate to contact us at WritingStudyUMD@gmail.com. Here is a link to your new writing task: *[Provide study link here]*.

4. Reminder email (to be sent if participant does not complete an entry within 3 days):

Your new writing task is awaiting completion

We recently sent you a link to a new writing task for the study **Writing about Ovarian Cancer**, conducted by Ana Popovska, M.A., Doctoral Candidate, and Dr. Mary Ann Hoffman, Professor, at the University of Maryland, College Park. We noticed that you have not completed your latest study entry and we are resending the link to your writing task. Please complete it ***within the next 3 days, if possible***. We strongly recommend that you find a private and comfortable setting without any interruptions for the next 20 min. If you have questions, do not hesitate to contact us at WritingStudyUMD@gmail.com.

Here is a link to your new writing task: *[Provide study link here]*.

5. Follow up email, to be sent 1 month after the last writing task:

Follow up survey

Thank you for participating in our study **Writing about Ovarian Cancer**, conducted by Ana Popovska, M.A., Doctoral Candidate, and Dr. Mary Ann Hoffman, Professor, at the University of Maryland, College Park. It has been 1 month since your last writing task and we are following up with some additional questions. We also want to know what you think of your participation in our study. This last part will take approximately 15 min and we ask that you complete it ***within the next week, if possible***. Again, we strongly recommend that you find a private and comfortable setting where you can complete your responses uninterrupted. If you have questions, do not hesitate to contact us at WritingStudyUMD@gmail.com. Follow up survey: *[Provide study link here]*

6. Follow up reminder, to be sent one week after the first follow up email, if participants do not respond to first follow up email:

Thank you for participating in our study **Writing about Ovarian Cancer**, conducted by Ana Popovska, M.A., Doctoral Candidate and Dr. Mary Ann Hoffman, Professor, at the University of Maryland, College Park. We recently sent you an email to complete the last part of the study. If you have not had a chance yet, please fill out this follow up survey, which should take only 15 min. Again, we strongly recommend that you find a private and comfortable setting where you can complete your responses uninterrupted. If you have questions, do not hesitate to contact us at WritingStudyUMD@gmail.com. Follow up survey: *[Provide study link here]*

Appendix C. Writing instructions

General instructions:

We strongly recommend that you choose a private and comfortable setting to complete today's writing task, where you will be able to write uninterrupted for 15 minutes.

Expressive Writing Condition:

What I would like you to write about for the next **15 minutes** are **your deepest thoughts and feelings about your experience with ovarian cancer**. I realize that women with ovarian cancer experience a full range of emotions, and I want you to focus on any and all of them. In your writing, I want you to really let go and explore your very deepest emotions and thoughts. You might think about all the various feelings and changes that you experienced before being diagnosed, after diagnosis, during treatment, and now. Whatever you choose to write, it is critical that you really focus on your deepest thoughts and feelings. Ideally, I would like you to focus on feelings, thoughts, or changes that you have not discussed in great detail with others. You might also tie your thoughts and feelings about your experiences with cancer to other parts of your life, i.e., your childhood, people you love, who you are, or who you want to be. Again, the most important part of your writing is that you really focus on your deepest emotions and thoughts. The only rule we have is that you write continuously for the entire time. If you run out of things to say, just repeat what you have already written. Don't worry about grammar, spelling, or sentence structure. Don't worry about erasing or crossing things out. Just write.

Fact Control Condition:

What I would like you to write about for the next 15 minutes are **the facts about your experience with ovarian cancer**. I realize that women with ovarian cancer experience many events, and I want you to focus on any and all of them in as much detail as possible. You might think about all the various events and changes that you experienced before being diagnosed, after diagnosis, during treatment, and now. Whatever you choose to write, it is critical that you really focus on the facts about your experiences. Ideally, I would like you to focus on facts that you have not discussed in great detail with others. You might also tie your writing about your experiences with cancer to other parts of your life, i.e., your childhood, people you love, who you are, or who you want to be. Again, the most important part of your writing is that you really focus on the facts about your experiences. The only rule we have is that you write continuously for the entire time. If you run out of things to say, just repeat what you have already written. Don't worry about grammar, spelling, or sentence structure. Don't worry about erasing or crossing things out. Just write.

Appendix D. Measures

1. Demographic questions:

1. What is your age? (You must be at least 18 to participate in this survey) ____
(Responses must be within the range of 18 – 99 to reduce mistakes of reporting.)
2. What country do you reside in?
 - United States
 - Canada
 - Other. Please specify:
3. If in the United States, what state do you reside in?
4. What is your racial/ethnic background? (Please select all that apply):
 - African-American/Black
 - Asian-American/Asian/Pacific-Islander
 - Asian-Indian
 - Hispanic/Latina
 - Middle Eastern/Arab
 - Native American/Native Alaskan
 - White/Caucasian
 - Biracial/Multiracial
 - Other. Please specify:
5. What is your highest level of education completed? (Please select one)
 - Below high school. Please provide the number of school years completed:
 - High school
 - Some college/university. Please provide the number of college/university years completed:
 - Associate's degree
 - Bachelor's degree
 - Master's degree
 - Doctoral degree
6. What is your current employment status?
 - Unemployed
 - Employed part-time
 - Employed full-time
 - Other. Please specify:
7. If unemployed, in what year did you last work?
8. What is your annual household income in USD (before taxes)?
 - Less than 30,000
 - 30,000 – 59,999

- 60,000 – 99,999
- 100,000 – 149,999
- 150,000 – 199,999
- 200,000 or higher
- Prefer not to report

9. What is your relationship status?

- Married/Partnered
- Divorced
- Widowed
- Single

10. In what year were you first diagnosed with ovarian cancer?

11. In what stage was your cancer at first diagnosis?

- I
- II
- III
- IV
- Other (please specify):

12. In addition to ovarian cancer, have you been diagnosed with other types of cancer?

- Yes. Please specify what type: ____ If yes, in what year you were diagnosed with this type of cancer? _____
- No

13. Are you currently in active treatment for ovarian cancer:

- Yes
- No

14. What kind of treatment for ovarian cancer have you received or are you in the process of receiving? (Select all that apply):

- Surgery
- Chemotherapy
- Hormone therapy
- Targeted therapy
- Radiation therapy
- Other. (Please specify):

15. How would you describe the current status of your ovarian cancer at this point:

- In remission
- Recurring after a remission. (If selected): In what year did your ovarian cancer re-occur? _____
- Progressing

○ Other. Please specify:

16. Please provide a current email address that will be used to communicate with you during the study. Please use **THE SAME** email for all parts of this study.

17. ***Please provide your email address here. Please use **THE SAME** email for all parts of this study:

***This question will appear at the beginning of each new survey.

2. Functional Assessment of Cancer Therapy – Ovarian, Version 4. Retrieved from
www.facit.org

Below is a list of statements that other people with your illness have said are important. **Please circle or mark one number per line to indicate your response as it applies to the past 7 days.**

<u>PHYSICAL WELL-BEING</u>		Not at all	A little bit	Some- what	Quite a bit	Very much
GP1	I have a lack of energy	0	1	2	3	4
GP2	I have nausea	0	1	2	3	4
GP3	Because of my physical condition, I have trouble meeting the needs of my family	0	1	2	3	4
GP4	I have pain	0	1	2	3	4
GP5	I am bothered by side effects of treatment.....	0	1	2	3	4
GP6	I feel ill	0	1	2	3	4
GP7	I am forced to spend time in bed	0	1	2	3	4

<u>SOCIAL/FAMILY WELL- BEING</u>		Not at all	A little bit	Some- what	Quite a bit	Very much
GS1	I feel close to my friends	0	1	2	3	4
GS2	I get emotional support from my family	0	1	2	3	4
GS3	I get support from my friends.....	0	1	2	3	4
GS4	My family has accepted my illness	0	1	2	3	4
GS5	I am satisfied with family communication about my illness.....	0	1	2	3	4

GS6	I feel close to my partner (or the person who is my main support)	0	1	2	3	4
Q1	<i>Regardless of your current level of sexual activity, please answer the following question. If you prefer not to answer it, please mark this box <input type="checkbox"/></i>					
GS7	I am satisfied with my sex life	0	1	2	3	4

Please circle or mark one number per line to indicate your response as it applies to the past 7 days.

<u>EMOTIONAL WELL-BEING</u>		Not at all	A little bit	Some-what	Quite a bit	Very much
GE1	I feel sad	0	1	2	3	4
GE2	I am satisfied with how I am coping with my illness	0	1	2	3	4
GE3	I am losing hope in the fight against my illness	0	1	2	3	4
GE4	I feel nervous.....	0	1	2	3	4
GE5	I worry about dying.....	0	1	2	3	4
GE6	I worry that my condition will get	0	1	2	3	4

<u>FUNCTIONAL WELL-BEING</u>		Not at all	A little bit	Some-what	Quite a bit	Very much
GF1	I am able to work (include work at home).....	0	1	2	3	4
GF2	My work (include work at home) is fulfilling.....	0	1	2	3	4
GF3	I am able to enjoy life.....	0	1	2	3	4

GF4	I have accepted my illness.....	0	1	2	3	4
GF5	I am sleeping well	0	1	2	3	4
GF6	I am enjoying the things I usually do for fun.....	0	1	2	3	4
GF7	I am content with the quality of my	0	1	2	3	4

Please circle or mark one number per line to indicate your response as it applies to the past 7 days.

		<u>ADDITIONAL CONCERNS</u>				
		Not at all	A little bit	Some- what	Quite a bit	Very much
O1	I have swelling in my stomach area.....	0	1	2	3	4
C2	I am losing weight	0	1	2	3	4
C3	I have control of my bowels	0	1	2	3	4
O2	I have been vomiting	0	1	2	3	4
B5	I am bothered by hair loss.....	0	1	2	3	4
C6	I have a good appetite.....	0	1	2	3	4
C7	I like the appearance of my body....	0	1	2	3	4
BMT 5	I am able to get around by myself ..	0	1	2	3	4
B9	I am able to feel like a woman.....	0	1	2	3	4
O3	I have cramps in my stomach area..	0	1	2	3	4
BL4	I am interested in sex	0	1	2	3	4
BMT 7	I have concerns about my ability to have children.....	0	1	2	3	4

3. Emotional Approach Coping Scale (EAC; Stanton, Kirk, Cameron, & Danoff-Burg, 2000).

We want to understand how women respond when they deal with ovarian cancer. These items ask what you are doing to cope with any of the stress you may be experiencing due to the ovarian cancer. There are many ways to deal with stressors. We want to know to what extent (how much or how frequently) you have been doing what each item says.

Make your answers as true for you as you can. [*Tentative ovarian cancer-specific instructions*]

1 = I haven't been doing this at all; 2 = I've been doing this a little bit; 3 = I've been doing this a medium amount; 4 = I've been doing this a lot.

Emotional Processing

I take time to figure out what I'm really feeling.

I delve into my feelings to get a thorough understanding of them.

I realize that my feelings are valid and important.

I acknowledge my emotions.

Emotional Expression

I let my feelings come out freely.

I take time to express my emotions.

I allow myself to express my emotions.

I feel free to express my emotions

4. Social Constraints Scale, adapted from (Lepore, Silver, Wortman & Wayment, 1996)

Following a diagnosis of ovarian cancer, people react in different ways. For example, some people want to talk about what has happened to them, while others don't. During the past week, how often have you ever wanted to talk about your experience with ovarian cancer?

Answer options: Almost never/Rarely/Sometimes/Often/Almost Always

Sometimes, even when other people have good intentions, they may say or do things that upset you. Think about the PAST WEEK and indicate how often other people in your life did the following things.

Use the scale that ranges from: 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often

1. How often did you feel as though you had to keep your feelings about your experience with ovarian cancer to yourself because they made other people uncomfortable?
2. How often did you feel that you could discuss your feelings about your experience with ovarian cancer with other people when you wanted to? (reverse coded)
3. When you talked about your experience with ovarian cancer, how often did other people give you the idea they didn't want to hear about it?
4. How often did you feel other people let you down by not showing you as much love and concern as you would have liked?
5. How often have other people really got on your nerves?

5. Intrusion of Events Scale (IES, Horowitz, Wilner & Alvarez, 1979)

On _____ (date) you experienced _____ (life event)

Below is a list of comments made by people after stressful life events. Please check each item, indicating how frequently these comments were true for you DURING THE PAST SEVEN DAYS. If they did not occur during that time, please mark the “not at all” column.

Frequency: Not at All, Rarely, Sometimes, Often

1. I thought about it when I didn't mean to.
2. I avoided letting myself get upset when I thought about it or was reminded of it.
3. I tried to remove it from memory.
4. I had trouble falling asleep or staying asleep, because of pictures or thoughts about it came into my mind.
5. I had waves of strong feelings about it.
6. I had dreams about it.
7. I stayed away from reminders of it.
8. I felt as if it hadn't happened or wasn't real.
9. I tried not to talk about it.
10. Pictures about it popped into my mind.
11. Other things kept making me think about it.
12. I was aware that I still had a lot of feelings about it, but I didn't deal with them.
13. I tried not to think about it.
14. Any reminder brought back feelings about it.
15. My feelings about it were kind of numb.

Intrusion subset (1,4,5,6,10,11,14); Avoidance subset (2,3,7,8,9,12,13,15)

6. The PANAS (Watson, Clark & Tellegen, 1988)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word.

Indicate to what extent you feel this way right now, that is, at the present moment. Use the following scale to record your answers.

1 = very slightly or not at all; 2 = a little; 3 = moderately; 4 = quite a bit; 5 = extremely

Interested	Irritable
Distressed	Alert
Excited	Ashamed
Upset	Inspired
Strong	Nervous
Guilty	Determined
Scared	Attentive
Hostile	Jittery
Enthusiastic	Active
Proud	Afraid

Appendix E. Statistical Outputs

Table 1E. Differences in baseline FACT-O scores and subscale scores between writing conditions

	Independent Samples Test for FACT-O Scores at Baseline							
	t-test for Equality of Means						95% Confidence Interval of the Difference	
	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper	
Quality of Life (FACT-O Total)	2.30	49	.03	12.26	5.32	1.57	22.95	
Physical Well-Being	1.69	49	.10	2.26	1.33	-.42	4.94	
Social Well-Being	2.30	49	.03	3.12	1.36	.39	5.86	
Emotional Well-Being	.83	49	.41	.92	1.11	-1.31	3.15	
Functional Well-Being	1.69	49	.10	2.39	1.41	-.45	5.23	
Additional Concerns	2.57	49	.01	3.56	1.39	.77	6.35	

Table 2E. Descriptive statistics for the ANCOVA analysis on differences in emotional well-being at follow up between the two writing conditions, controlling for baseline emotional well-being.

Descriptive Statistics

Dependent Variable: Emotional Well-Being at Follow Up

Writing Condition	Mean	Std. Deviation	N
Fact Control	17.584	3.90	25
Expressive Writing	20.160	3.08	25
Total	18.87	3.71	50

Table 3E. Summary statistics for the ANCOVA analysis on differences in emotional well-being at follow up between the two writing conditions, controlling for baseline emotional well-being.

Tests of Between-Subjects Effects

Dependent Variable: Emotional Well-Being at Follow Up

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ^b
Corrected Model	440.71 ^a	2	220.35	44.06	.00	.65	88.13	1.000
Intercept	60.38	1	60.38	12.07	.00	.20	12.07	.96
Baseline Emotional Well-Being	357.76	1	357.76	71.54	.00	.60	71.54	1.000
Condition	36.13	1	36.13	7.23	.01	.13	7.23	.75
Error	235.04	47	5.00					
Total	18483.36	50						
Corrected Total	675.74	49						

a. R Squared = .65 (Adjusted R Squared = .64)

b. Computed using alpha = .05

Table 4E. Descriptive statistics for the ANCOVA analysis on differences in quality of life at follow up between the two writing conditions, controlling for baseline quality of life.

Descriptive Statistics

Dependent Variable: Quality of Life at Follow Up

Writing Condition	Mean	Std. Deviation	N
Fact Control Condition	108.34	22.19	25
Expressive Writing Condition	123.69	21.05	26
Total	116.17	22.76	51

Table 5E. Summary statistics for the ANCOVA analysis on differences in quality of life at follow up between the two writing conditions, controlling for baseline quality of life.

Tests of Between-Subjects Effects

Dependent Variable: Quality of Life at Follow Up

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	20467.74 ^a	2	10233.87	90.53	.00	.79
Intercept	10.35	1	10.35	.09	.76	.00
Baseline Quality of Life	17463.28	1	17463.28	154.49	.00	.76
Writing Condition	115.51	1	115.51	1.02	.32	.02
Error	5425.90	48	113.04			
Total	714115.31	51				
Corrected Total	25893.64	50				

a. R Squared = .79 (Adjusted R Squared = .78)

Table 6E. Model Summary for a hierarchical weighted least squares regression analysis predicting emotional well-being at follow up from social constraints (1), emotional approach coping (2), writing condition (3), the interaction between social constraints and emotional approach coping (4), the interaction between social constraints and writing condition (5), the interaction between emotional approach coping and writing condition (6) and the 3-way interaction between social constraints, emotional approach coping and writing condition.

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.61 ^a	.37	.33	1.27	.37	9.12	3	47	.00
2	.61 ^b	.37	.29	1.31	.01	.13	3	44	.94
3	.63 ^c	.40	.31	1.29	.03	2.07	1	43	.16

a. **Predictors:** (Constant), 1, 2, 3

b. **Predictors:** (Constant), 1, 2, 3

Interaction Terms: 4, 5, 6

c. **Predictors:** (Constant), 1, 2, 3

Interaction Terms: 4, 5, 6, 7

Table 7E. Coefficients for a hierarchical weighted least squares regression analysis predicting emotional well-being at follow up from social constraints, emotional approach coping and writing condition

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	17.56	.68		25.91	.00
Writing Condition	2.00	.89	.30	2.23	.03
Emotional Approach Coping	.500	.48	.14	1.04	.30
Social Constraints	-2.47	.70	-.49	-3.54	.00

Table 8E. Hierarchical multiple regression model predicting quality of life at follow up from social constraints (1), emotional approach coping (2), writing condition (3), the interaction between social constraints and emotional approach coping (4), the interaction between social constraints and writing condition (5), the interaction between emotional approach coping and writing condition (6) and the 3-way interaction between social constraints, emotional approach coping and writing condition, controlling for baseline quality of life (covariate).

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.90 ^a	.81	.80	9.99	.81	196.86	1	47	.00
2	.91 ^b	.82	.80	9.99	.01	1.00	3	44	.40
3	.92 ^c	.84	.82	9.61	.03	2.18	3	41	.11
4	.92 ^d	.85	.82	9.55	.01	1.57	1	40	.22

a. **Predictors:** (Constant), covariate

b. **Predictors:** (Constant), covariate, 1, 2, 3

c. **Predictors:** (Constant), covariate, 1, 2, 3

Interaction Terms: 4, 5, 6

d. **Predictors:** (Constant), covariate, 1, 2, 3

Interaction Terms: 4, 5, 6, 7

Table 9E. Coefficients for the marginally significant (Model 3) hierarchical multiple regression model predicting quality of life at follow up from emotional approach coping, social constraints, writing condition, the interaction between social constraints and emotional approach coping, the interaction between emotional approach coping and writing condition and the interaction between social constraints and writing condition, controlling for baseline quality of life (covariate).

Model		Coefficients				Sig.
		Unstandardized Coefficients		Standardized Coefficients	t	
		B	Std. Error	Beta		
3	(Constant)	-8.31	10.05		-.83	.41
	Baseline quality of life (covariate)	1.03	.09	.92	11.86	.00
	Emotional approach coping	.46	2.25	.02	.21	.84
	Social constraints	10.95	4.77	.26	2.30	.03
	Writing condition	3.74	3.03	.08	1.23	.23
	Social constraints X Emotional approach coping	.97	4.12	.02	.24	.82
	Emotional approach coping X Writing condition	-3.24	4.23	-.07	-.77	.45
	Social constraints X Writing condition	-11.97	5.63	-.22	-2.13	.04

Table 10E. A hierarchical linear regression model predicting average negative affect post writing sessions from writing condition (1), emotional approach coping (2) and the interaction between writing condition and emotional approach coping (3).

Model		Coefficients ^a				Sig.
		Unstandardized Coefficients		Standardized Coefficients	T	
		B	Std. Error	Beta		
1	(Constant)	15.43	1.01		15.29	.00
	(1)	-1.33	1.41	-.13	-.94	.35
	(2)	-.08	.88	-.01	-.09	.93
2	(Constant)	15.43	1.01		15.33	.00
	(1)	-1.33	1.41	-.13	-.94	.35
	(2)	-.90	1.14	-.15	-.79	.43
	(3)	1.98	1.77	.21	1.12	.27

a. Dependent Variable: Average Negative Affect Post Writing Sessions

Table 11E. Model summary for predicting emotional well-being at follow up from writing condition (1), average positive affect post writing sessions (2), average negative affect post writing sessions (3), the interaction between writing condition and average positive affect post writing session (4), and the interaction between writing condition and average negative affect post writing sessions (5)

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.74 ^a	.55	.53	2.82
2	.78 ^b	.61	.57	2.69

a. Predictors: (Constant), 1, 2, 3

b. Predictors: (Constant), 1, 2, 3, 4, 5

Table 12E. Coefficients for the models predicting emotional well-being at follow up from writing condition (1), average positive affect post writing sessions (2), average negative affect post writing sessions (3), the interaction between writing condition and average positive affect post writing session (4), and the interaction between writing condition and average negative affect post writing sessions (5)

Model		Coefficients ^a				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	17.97	.57		31.70	.00
	(1)	1.28	.80	.16	1.60	.12
	(2)	.16	.06	.30	2.67	.01
	(3)	-.41	.09	-.50	-4.37	.00
2	(Constant)	17.90	.54		33.02	.00
	(1)	1.21	.76	.15	1.59	.12
	(2)	.23	.07	.44	3.12	.00
	(3)	-.24	.11	-.30	-2.19	.03
	(4)	-.18	.11	-.23	-1.61	.12
	(5)	-.48	.19	-.34	-2.55	.01

a. Dependent Variable: Emotional Well-being at Follow Up

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