The Effects of Hand Holding on Cancer Patients Level of Anxiety: A Single-Case Study

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The Effects of Hand Holding on Cancer Patients Level of Anxiety:
A Single-Case Study

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by

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Abstract

The purpose of this dissertation was to explore how the anxiety levels of non-Hodgkin’s lymphoma patients receiving chemotherapy are affected while holding hands with a secure attachment. This study utilized three experimental single-case designs: participant one measured under a B-design, participant two measured under a B-A design, and participant three measured under an A-B design. Each participant’s anxiety was assessed during six chemotherapy treatments and one meeting with their primary oncologist to discuss the prognosis of their cancerous disease. Results visually indicate a greater effect on anxiety reduction during treatment when the intervention is utilized compared to only having a secure attachment present. Visual analysis revealed a reducing trend in anxiety for participant one when holding hands. Participants two and three’s anxiety continued to decline while holding hands throughout treatments but increased when hand holding was removed. Follow-up interviews of all three participants support the positive effects hand holding had on anxiety reduction during treatment. The results of this study may inform mental health professionals and oncology care teams consulting cancer patients about effective coping interventions against anxiety experienced during treatment. Future research should replicate this study focusing on single-case reversal designs.

Keywords: hand holding, lymphoma, relationship attachment, anxiety
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CHAPTER I:
INTRODUCTION

In 2016, Armitage, Gascoyne, Lunning, and Cavalli (2017) estimated that 72,580 cases of non-Hodgkin’s lymphoma would be diagnosed in the United States. The American Cancer Society (2018) has estimated that 74,680 people (41,730 males and 32,950 females) will be diagnosed with non-Hodgkin’s lymphoma and 19,910 people will die from the disease in 2018. Factors such as immune disorders, medicines, infections, lifestyle, genetics, race, family history, and occupation impact an individual’s risk of developing non-Hodgkin’s lymphoma (Armitage et al., 2017). After the diagnosis of non-Hodgkin’s lymphoma, patients typically have a five-year survival rate of 70% and a ten-year survival rate of 60% (American Cancer Society, 2016b). Depending on the type, grade, and stage of a patient’s non-Hodgkin’s lymphoma, patients are either administered a current curative intent treatment regimen such as chemotherapy, given a stem cell transplant, or even the use of a surgical procedure (American Cancer Society, 2016b). However, these treatments create physical and psychological side effects throughout and after completion (Adler & Page, 2008; American Cancer Society, 2016a). Khalil et al. (2016) revealed that 48.7% (N = 300) of general cancer patients suffer from anxiety throughout treatment. Chemocare (2018) explains that anxiety among cancer patients may consist of uneasiness, nervousness, worry, or fear in relation to cancer. Oerlemans et al. (2014) revealed that 10% (N = 489) of non-Hodgkin’s lymphoma patients reported that they were always anxious or depressed, and 15% reported feeling anxious or depressed some of the time for the duration of their treatment. Further, Oerlemans et al. (2014) have indicated that up-to-date research is exceeding 15 years when focusing on anxiety and depression reduction interventions among lymphoma patients. However, research has found that some forms of physical comfort can
ameliorate anxiety among non-Hodgkin’s lymphoma patients. Moon and Cho (2001) reported that physical touch provides beneficial outcomes in anxiety reduction for cancer patients. Specifically, they found that holding hands is a form of physical touch comfort that reduces anxiety (Moon & Cho, 2001). In addition to physical touch, the physical presence of another person can provide comfort, when that support is based on a secure attachment.

As a secure attachment is necessary for an individual’s psychological wellbeing (Ainsworth, 1973; Bowlby, 1969), interventions of physical touch, such as holding hands, can aid in reducing anxiety (Moon & Cho, 2001). A secure attachment, as defined in this study, is the enduring emotional bond that one person feels with another, which results in the ability to manage anxiety. Johnson et al. (2013) explained that holding hands with an individual to whom one is securely attached may contribute to a reduction in their perception of significant threat-related brain activation. The bond of a secure attachment limits the neural activity a patient experiences (Johnson et al., 2013), which may allow the patient to experience lower levels of threat and anxiety. This neural activity links to the body’s immune system responses; therefore, limiting neural activity helps the body’s adaptive immune system react more efficiently to cancer treatment (Parham, 2009). Parham (2009) clarified that reduced anxiety aids in the body’s physical adaptation to cancer treatment. This study, therefore, will address the relationship between secure attachment and daily hand holding in relation to anxiety among non-Hodgkin’s lymphoma patients.

**Statement of the Problem**

Although most individuals adapt well when experiencing change in their life, a cancer diagnosis may negatively impact the emotional well-being and quality of life of a patient, a patients family, and even caregivers (American Cancer Society, 2016b). Further, cancer patients...
and cancer survivors may feel distress about the future even years after the cancer is treated (American Cancer Society, 2016b). The fear of treatment, frequent visits to medical clinics or a hospital, and undergoing continual tests may create more anxiety for the patient by thinking something bad and unknown is going to happen (American Cancer Society, 2016b).

As previously mentioned, a variety of side effects associated with the diagnosis and treatment of cancer can negatively impact patients and their family members even after treatment is completed (Adler & Page, 2008, American Cancer Society, 2016b). In addition to the fact that the longevity of chemotherapy sessions may cause damage to the body and its functions (American Cancer Society, 2016a), research suggests that patient’s experience higher levels of stress and anxiety during chemotherapy treatments (Barre, Padmaja, Saxena, & Rana, 2015). Depending on the type of diagnosis, treatment regimen, and future prognosis, these patients are susceptible to experience heightened emotional and mental health problems (Adler & Page, 2008). Further, the patient’s own experienced anxiety throughout the diagnosis and over the course of treatments can cause fear and anxiety for their caregivers in relation to losing their loved ones, thus creating a cycle of negative emotions for both the patient and caregiver (Adler & Page, 2008). Post diagnosis, the psychological side effects of non-Hodgkin’s lymphoma can affect patients’ overall wellbeing, future outlook, and relationships with others (Adler & Page, 2008). These negative emotions can develop overtime and create symptoms that mimic or even classify as post-traumatic stress disorder. The American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders (DSM-5) explains that experiencing a life threatening medical illness or even observing it in another can contribute to the future signs of post-traumatic stress disorder (PTSD; American Psychiatric Association, 2013). Therefore, active engagement through holding hands with an individual with whom they are securely
attached (in this case, a caregiver) may prove useful for both patients and caregivers in managing the effects of cancer.

Interventions for mental and emotional effects remain limited during non-Hodgkin’s lymphoma treatment. Research specifically focuses on the need for interventions to treat patient anxiety (Barre et al., 2015). Maresh, eBeckes, and Coan (2013) measured both state and trait anxiety; their research indicates that the role of social support through holding hands regulates emotional responses in anxious individuals. State anxiety is described as an unpleasant emotional stimulation in threatening demands or dangers (Schwarzer, 1997). Lazarus (1991) explains a threat must be experienced for the mind to appraise this emotion. Trait anxiety, however, reflects the presence of established individual variances in response with state anxiety in the expectation of threatening situations (Schwarzer, 1997). Additionally, Oh and Park (2004) found that both hand massage and hand holding are effective nursing interventions contributing to psychological and physiological anxiety alleviation for patients undergoing local infiltration anesthesia. Similarly, a phenomenological study of cancer patients undergoing treatment revealed that hand holding was a distraction from treatment, a source of security, and reduced pain through patients feeling more secure (Weekes, Kagan, James, & Seboni, 1993). Moreover, Weekes’ et al. (1993) research explained that hand holding during treatment should be further studied utilizing qualitative and quantitative measures to explore the effects of hand holding within the realm of a patient’s family.

Hand holding as an intervention to manage anxiety has not been limited to the population of cancer patients undergoing treatment. Pirbudak and Tepe (2017) introduced hand holding in the context of gynecology procedures at the single case level, and all participants displayed positive effects in terms of pain and anxiety. Similarly, Ergott (2008) described a birthing
experience in which vital signs were alarmingly low raising concern. Despite the efforts of the medical staff, Ergott (2008) believes it was the strength drawn from hand holding of the nursing staff that kept the mother alive throughout delivery. Based on the aforementioned research, the non-invasive intervention of holding hands during medical treatment appears to create a reasonable belief in effectiveness to relieve patient anxiety.

**Purpose of the Study**

The purpose of this dissertation was to explore how the anxiety levels of non-Hodgkin’s lymphoma patients receiving chemotherapy are affected while holding hands with a secure attachment. Further, this study’s results focus on the effectiveness of hand holding as an intervention across various single-case designs to explore appropriate needs in the development of future experimental designs. Many cancer patients seek the guidance of mental health professionals to learn coping skills given the effects of the diagnosis and treatments. This dissertation strives to assist patient’s mental health and educate mental health professionals as patients are treated. The following research question provided the focal point for this study: How does holding hands with a secure attachment impact a non-Hodgkin’s lymphoma patients (N = 3) anxiety, as measured by the State Trait Anxiety Inventory (Speilberger et al., 1983). Based on the results, the researcher discusses an agenda for future experimental design research integrating effective interventions for various cancer patients of appropriate diseases utilizing a secure attachment and hand holding.

**Significance of the Study**

The results from this study seek to enrich the psychological care of non-Hodgkin’s lymphoma patients through the intervention of hand holding during the treatment of non-Hodgkin’s lymphoma. Specifically, this study explores the anxiety levels of non-Hodgkin’s
lymphoma patients undergoing chemotherapy and how the expression of a secure attachment (psychological) via hand holding (physical) influences anxiety. Adler and Page (2008) indicated the lack of research related to the negative experienced mental and emotional effects of cancer treatment on both patients and caregivers during treatment.

It was necessary to employ various single-case designs given the specific population selected and the difficulty keeping a patient’s timeline of treatment consistent. A non-Hodgkin’s lymphoma patient’s treatment and procedures vary on many factors including but not limited to: age, type of non-Hodgkin’s lymphoma, grading, staging, and reaction to the treatment. Thus, the use of various single-case designs may provide specific contributions to this field. In addition, Ray (2015) stressed the importance of and need for more single-case research and noted that this method has been recognized as a valuable approach dating back to the work of experimental psychologists in the 1880s. The single-case design allows for detailed results for the individual in the study. Adler and Page (2008) discussed the issues of generalizable results, such as available brochures educating patients about their disease, not conforming to the needs of each patient. Thus, the goal of this study is to find more specifics, on a case-by-case basis, through the various single-case designs. Based on these individual details, this study supports the need for additional studies and discussions on secure attachment relationships using hand holding as an intervention during cancer treatment.

This study was designed to be easily replicated. Specifically, one may utilize any available local oncology department treating non-Hodgkin’s lymphoma patients, follow the instructions within the assessment used, and adhere to the data collection procedures described to assist in accurate and replicable research for evaluating the effectiveness of hand holding as an anxiety reduction intervention among cancer patients. Further, the study was focused on the
individual level, which places emphasis on the reasonable effects of the intervention. The researcher hopes that this study can guide oncology settings to implement this intervention across the treatment of cancer patients.

**Definition and Operational Terms**

For the purposes of this study, the following definitions will apply:

1. *Secure Attachment* is the enduring emotional bond that a person feels with another that results in the ability to manage anxiety (Ainsworth, 1973; Bowlby, 1969). To avoid confusion, the definition should be read and used in the right context provided by Ainsworth (1973) and Bowlby (1969). For the purposes of this study, the term secure attachment refers to the individual the non-Hodgkin’s lymphoma patients selected to attend treatments with them.

2. *Hand holding* refers to the intervention used within the study. Specifically, this term refers to the action being administered during the intervention phase to compare the baseline phase where hand holding is absent. The non-Hodgkin’s lymphoma patient will hold the non-dominant hand of the secure attachment during chemotherapy treatment. Scores of the STAI (Speilberger et al., 1983) serve as the operational definition in accessing the effectiveness of hand holding as an intervention for alleviating anxiety during non-Hodgkin’s lymphoma treatment.

3. *CT scan meeting* refers to the Computed Tomography Scan that non-Hodgkin’s lymphoma patients receive to determine diagnosis before treatments and prognosis measured at the oncologist’s discretion.

**Assumptions of the Study**

There are many assumptions implicit within this study. First, the researcher assumes that
each patient was required to follow the directed treatment regimen and procedures outlined by their primary oncologist. Second, the researcher assumes that results vary depending on the safety and security of relationships between the cancer patient and his or her social and / or caregiving network. Third, the researcher assumes the cancer patients involved in the study have differing demographics and attributes, since non-Hodgkin’s lymphoma can be diagnosed within diverse populations. Fourth, the researcher assumes that hand holding with a secure attachment can lead to decreased anxiety levels throughout treatment. Fifth, the researcher assumes the cancer patients participating in this study have answered all questions honestly and without bias. Sixth, the researcher assumes that the participants completed the Participant Screening Form (Appendix D) honestly. The Participant Screening Form (Appendix D) acts as an assessment to specifically rule out the chance of a patient feeling anxious while holding hands with a secure attachment. For more details regarding the specifics of the secure attachment, or hand holding and anxiety, see the Participant Screening Form (Appendix D). Seventh, the researcher assumes that the secure attachment follows the Secure Attachment Protocol Form (Appendix E) accurately, and if deviation were to occur, that the secure attachment noted specifics within the Post Session Questionnaire (Appendix F). Finally, the researcher assumes that the obtained data is valid and reliable. These assumptions direct the results and discussion section, and were evaluated throughout the course of the study.

**Delimitations**

This study was conducted among patients who have been diagnosed with non-Hodgkin’s lymphoma at a mid-south oncology department. Patients diagnosed in stages one through four of this disease were admitted into the study. According to the American Cancer Society (2016b), a patient is said to have good prognostic factors if they meet the following classifications: be 60
years of age or younger, and be diagnosed within stages one or two. Patients who display poor prognostic factors are 60 years of age or older, and are diagnosed with stages three or four (American Cancer Society, 2016b). For the purposes this study, inclusion criteria was not sensitive to staging of the disease, but that the patient be diagnosed with non-Hodgkin’s lymphoma. For more details regarding acceptance, see the Participant Screening Form (Appendix D).

Next, a patient could not have an existing anxiety-related, DSM-V-diagnosed mental disorder. This diagnosis would indicate the participant already had a high anxiety level, potentially even in the presence of the caretaker. Further, preexisting anxiety may have been related to a prior past life event. Thus, to allow for more clear results, these individuals were not accepted into the study. A participant could not have any physical conditions related to past cancer treatment. If the participant had previously experienced the chemotherapy process by receiving treatment, this may impact the results and may not allow for true measures. Some accepted participants may have experienced cancer through a relative or friend; this did not impact their acceptance into the study. Lastly, per the Participant Screening Form (Appendix D), only patient’s who had a secure attachment were allowed into the study. Each individual experiences the treatment process differently. Therefore, within the research design, the researcher aimed to accommodate the uniqueness of each participant. The researcher chose a single-case research design over other designs in order to highlight the uniqueness of each individual in treatment, and because there are a limited amount of treatments for non-Hodgkin’s lymphoma, and a single-case study research design helps differentiate what interventions work with certain individuals, in certain conditions (Ray, 2015).

It is not within the scope of this study to identify whether an individual’s physical
presence in the room, or communication with a patient has an effect on anxiety, but rather to draw specific conclusions about a patient’s anxiety levels. Participants receiving treatment must have been given a diagnosis of non-Hodgkin’s lymphoma. The primary variable of debate, though not limited to, is that a participant’s anxiety decreased as the result of the presence of a secure attachment during treatment. This may reduce the significant impact hand holding has on anxiety. Therefore, participants meeting criteria were selected based on the date of their prognosis meeting. The prognosis meeting was an appointment where each participant completed with their primary oncologist to review the results of their Computed Tomography Scan (CT scan meeting) and determine a prognosis. Participant one served as a monitor of intervention effectiveness across all measures, and if the intervention was meaningful. Thus, participant one completed five chemotherapy measures, then the CT scan meeting, and then the final chemotherapy measure while holding hands with a secure attachment. This control allowed the researcher to track the effectiveness of hand holding for this participant and to see if the CT scan meeting influences the results. Given the positive results of the hand holding intervention, the study was changed for participants two and three to use phase randomization to assist in controlling the aforementioned confounding variables (Onghena & Edgington, 2005), such as the CT scan meeting. The CT scan meeting for participant two and three were measured first, followed by the six chemotherapy measures to see if this trend would continue across participants. Controlling when the chemotherapy measures began allowed the researcher to draw more specific conclusions about the effectiveness of hand holding with a secure attachment during treatment. Additionally, participant two was selected to undergo the intervention of hand holding for the CT scan meeting and the first three chemotherapy measures and then measuring the last three without holding hands. Participant three underwent the CT scan meeting and first
three chemotherapy measures without holding hands and then measured the last three while holding hands. This structure allowed the researcher to differentiate between the potential effects of the secure attachments presence from the effects of holding hands during treatment.

This study was not conducted with individuals going through treatment without a secure attachment, due to the lack of emotional connection while holding hands may skew the results. Cancer patients’ anxiety levels were measured during chemotherapy to ensure this study’s effectiveness. It is important to note that the participants’ secure attachments were responsible for scoring the assessment, as the researcher was not able to attend each participant’s chemotherapy sessions. The accuracy of responses was assessed within the Post Session Questionnaire (Appendix F). The secure attachment functioned as an additional participant in the study, completing all necessary consent. The secure attachment also completed a Post Session Questionnaire (Appendix F) to describe any deviation from the Secure Attachment Protocol Form (Appendix E), if the cancer participant deviated from the treatment routine, or if external circumstances hindered authentic responses to the STAI (Speilberger et al., 1983).

Summary

The aim of this study was to increase research related to the reduction of anxiety for non-Hodgkin’s lymphoma cancer patients by identifying the effects of hand holding at the single-case level. It provides evidence that supports hand holding as an effective intervention in anxiety reduction for non-Hodgkin’s lymphoma. The benefit of a single-case design is the small sample size, and that it allows each participant to function as their own control, compared to the intervention measurements (Ray, 2015). This chapter addressed the current gap in literature with respect to hand holding as a form of physical touch intervention to ameliorate anxiety among non-Hodgkin’s Lymphoma patients, as well as the direction for this study. Chapter two will
provide a literature review comprising more research that supports this study.
CHAPTER II:
LITERATURE REVIEW

The process of chemotherapy can create negative physical and mental effects. Within this chapter, the researcher reviewed literature on the development of human connection through physical touch, beginning in the work of Hippocrates and continuing to present day forms of physical touch and its effects. Moreover, research was outlined on the types of physical touch and the effects of physical touch in its various forms. Second, the researcher provided an evaluation of anxiety with a focus on the psychological issues that may be present throughout treatment. Additionally, literature on cancer patients’ quality-of-life as a result of the anxiety present in treatment was discussed. Third, the researcher identified relationship attachment through the following constructs: an overview of relationship attachment and its effects; neuroscience with relationship attachment; and an overview of the relationship attachment styles based on attachment theory. Fourth, the history of lymphoma was explored. This chapter concludes with a brief summary to explain how the importance of physical touch through a secure attachment during chemotherapy may have a greater impact on a lymphoma patient psychologically than extant research has yet addressed.

Method of Systematic Review

The researcher compiled the information for this literature review from the following databases: EBSCO Host, PsychINFO, ProQuest, and UpToDate Databases. The following keywords were used either individually or in conjunction with one another: “physical touch,” “hand holding,” “relationship attachment,” “cancer,” “lymphoma,” “anxiety,” and “immune system.” Additionally, print sources such as books and articles were provided by oncologists at a mid-south cancer treatment facility, advising professors, and university library personnel.
Finally, the researcher purchased State-Trait Anxiety Inventory for each patient’s treatment measurement.

**Lymphoma**

**History of Lymphoma**

Lymphoma can be described as a tumor of lymphocytes that grow within the lymph nodes and other tissues; the malignant lymphocytes are not able to enter the blood in sizeable numbers (Parham, 2009). Additionally, lymphoma can be understood as a cancer that starts in cells in association with the body’s immune system (American Cancer Society, 2016). There are two primary types of lymphoma: Hodgkin’s Lymphoma (named after Dr. Thomas Hodgkin, who first discovered the disease) and non-Hodgkin’s Lymphoma. Hodgkin’s lymphoma is frequently discovered in adolescents and older adults, and accounts for 10% of cancers diagnosed annually (Jacobs & Harvey, 2013). Approximately 92% of Hodgkin lymphoma patients have a one-year survival rate at the stage of prognosis (American Cancer Society, 2014). Non-Hodgkin’s lymphoma (NHL) has been studied as the most common hematological malignancy in the world (Limat et al., 2014) and is the seventh most common cancer in North America, with a frequency that has risen 15% throughout the past two decades (Lin et al., 2014). Brenner, Gondos, and Arndt (2007), have reported that since the 1980s, the long-term prognosis of NHL has improved. Advances have been made in chemotherapy treatment regimens that attack the disease aggressively (Limat et al., 2014).

The following constructs will be discussed in more detail in order to better understand lymphoma: function of lymph nodes, development of lymphoma, treatment, and the physical and psychological effects of treatment.
Function of Lymph Nodes

The immune system is vital in the treatment of lymphoma, as the disease affects the lymph nodes. The lymph node is one of the important sites in the human body where “immune responses to pathogenic antigens are initiated” (Buettner & Bode, 2012, p. 205). As the lymph nodes engage a foreign agent of the body, a process occurs, which Buettner and Bode (2012) described as a migration of cells from one receptor to antigens for effective antibody production. This precise migration is possible because of homing molecules that are up-regulated on effector cells after activation. (Buettner & Bode, 2012, p. 205) If this migration process does not function at capacity, complications such as lymphoma can arise.

Development of Lymphoma and Treatment Options

For a cancer cell to be deemed successful and/or life threatening, it must consist of seven core principles. Parham (2009, p. 494) has developed a list of these principles:

1. Cancer cells stimulate their own growth
2. Cancer cells ignore growth-inhibiting signals from other cells
3. Cancer cells avoid death by apoptosis
4. Cancer cells connect to the blood
5. Cancer cells invade other tissues
6. Cancer cells inexorably expand to the size of their population
7. Cancer cells outwit the immune system to survive

When treating non-Hodgkin’s lymphoma, there are many options dependent of the type, grade, and stage of the disease. Options can include chemotherapy, immunotherapy, targeted therapy drugs, high-dose chemotherapy and stem cell transplant, and even surgery (American Cancer Society, n.d.). For more specifics on the chemical makeup of each drug and its function,
the reader should consult the Lymphoma Research Foundation and the American Cancer Society.

Physical and Psychological Side Effects of Treatment

Throughout the treatment of cancer, a patient may experience physical and/or psychological effects. Milanti, Metsälä, and Hannula, (2016) confirmed that psychological distress is a common problem among patients with cancer, and that many of these effects are left untreated and unreported. The American Cancer Society (2016) has described physical side effects, including heart or nerve damage, as potentially long-term, and has noted that results may vary depending upon the individual experience. Given these findings, more research is needed to understand more of the physical and psychological effects a patient may experience.

Physical. Cancer patients may experience long-term and/or late effects (Darnley, Liebertz, Morales, Vose, & Zebrack, 2009), which vary by the individual patient depending on the patient’s treatment, cancer, and biological factors. Long-term side effects manifest during treatment, and may continue for months, and even in some cases up to several years; such effects include fatigue, menopausal symptoms, and cardiovascular problems (Darnley et al., 2009). While these are only a few of the many side effects experienced long-term, they are significant to mention for the purposes of this study in that each may create an emotional struggle for a patient. Late effects typically develop post treatment, and may include infertility, osteoporosis, and secondary cancers (Darnley et al., 2009). Late effects in this category may be more noticeable in the quality-of-life (QOL) of a patient compared to another who has not undergone treatment.

Oerlemans et al. (2014) designed a study to determine whether patients suffer from anxiety or depression throughout treatment. Results indicated that younger patients reported higher anxiety scores, whereas older patients displayed higher depressive scores (Oerlemans et
The results further indicated that 13% of Hodgkin’s lymphoma patients experienced anxiety all the time (during treatment) and 11% were always depressed (Oerlemans et al., 2014). While these results are specific to Hodgkin’s lymphoma, given the similar treatment protocols, these findings likely also apply to NHL. Further, they indicate that there may be a need for patient support from a psychological perspective.

**Psychological.** Existing research has shown that, despite modern progress in securing remission, cancer still remains a disease that correlates to feelings of hopelessness, pain, fear, and death (R. Singh, H. Singh, C. Singh, & Kaur, 2015). Singh et al. (2015) described cancer diagnosis and treatment as psychologically stressful, resulting from the authentic symptoms of the disease and fear that cancer can be a silent killer moving throughout the body without warning. Cancer has retained psychological connotations of grief and pain; research studies have indicated that a significant percentage of cancer patients have suffered psychologically (Parker, Baile, de Moor, & Cohen, 2003). Despite the fact that Singh et al. (2015) and Parker et al. (2003) suggest that cancer is associated with these negative emotions, there has been a lack of research to indicate a connection between the physical effects of treatment and its psychological effects.

**Neurobiology: Reaction to Stress and Anxiety**

Research has shown that cancer patients who are being treated with chemotherapy may develop distress before treatment (Jacobson, Bovbjerg, & Redd, 1993; Jacobson et al., 1995; Sabbioni, Bovbjerg, Jacobson, Manne, & Redd, 1992). Morrow and Dobkin (1988) have theorized these distressed reactions from previous cancer patient’s experiences to classical conditioning, or learned responses to the environment and treatment conditions such as physical and psychological triggers. As a patient develops these responses, it may become difficult to
disassociate cancer treatment as a distressing situation. Cameron et al. (2001) explained how
the responses to a situation creates ongoing distress for a patient:

Classical conditioning theory posits that emetogenic cancer treatment (unconditioned
stimulus [US]) produces a physical side effect of nausea or vomiting (unconditioned
response [UR]). Sight, smells, and tastes associated with administration of the therapy
(conditioned stimuli [CS]) are paired with the toxic treatment, and anticipatory symptoms
develop (conditioned response [CR]). Over repeated pairings (treatment cycles) the
formerly neutral CS alone can elicit the aversive response. (p. 72)

Given this research, a patient may not be able to avoid these possible triggering conditions
before, during, or post treatment (Cameron et al., 2001). The following findings are presented in
order to enable an understanding of stress and anxiety from a neurobiological perspective, as
well as how this persistently affects cancer patients.

**Anxiety**

Research has shown that 44% of cancer patients reported a form of anxiety, and 23% of
cancer patients showed significant anxiety (Schag & Heinrich, 1989; Stark et al., 2002). With
these results, there may be a strong need for patients to be assessed throughout the treatment
process. Additionally, anxiety results in a predictive response to cancer diagnosis, which occurs
in varying degrees and may increase as a patient’s disease progresses, or as the treatment
regimen becomes more aggressive or debilitating (Breitbart, 1995). Therefore, as the treatment
regimen progresses, it makes sense that patients’ anxiety levels would increase correspondingly.
Cancer patients run the risk of developing anxiety disorders that can affect their social roles,
relationships, and goals relating to life plans (Smith, Cope, Sherner, & Walker, 2014). This risk
can increase during cancer treatment when certain factors exist, including: pre-existing condition
of anxiety disorder, severe pain, present anxiety during diagnosis, limitations with functioning,
lack in social support, advancing disease, and / or a history with trauma (National Cancer
Institute, n.d.). Therefore, a patient’s history pertaining to anxiety should be assessed, and may
be helpful for the oncology department to be aware of when treating the patient holistically. Patients are often reluctant in speaking to their oncologist about fears and anxieties they may have following their diagnosis (Smith et al., 2014). This may be related to their perception that the oncologist is focused only on treating the disease. Conversely, patients often share emotions with nursing staff while engaging in treatment or infusion (Smith et al., 2014). This may be related to the patient’s perception that the oncologist is addressing the body, and the nursing staff is more available to check in mentally and physically with the patient throughout treatment.

**Stress**

In a broad sense, stress may be defined as mental responses to demands of the body (Koob, 1999). During a period of stress, the body is signaling the mind that something is abnormal. Therefore, stress is the body’s reaction during a transition requiring a physical, mental, or emotional adjustment in response (Selye, 1936). As the body signals the mind, the mind may then identify the mental or physical stressor present. Stress is known to arise in any situation or thought causing frustration, anger, nervousness, or anxiety (Kumar, Rinwa, Kaur, & Machawal, 2013). As an individual’s emotion develops, and if a solution is not found, stress may result.

Stress becomes a stimulus, both internally and externally, that activates the hypothalamic pituitary adrenal (HPA) axis as well as the sympathetic nervous system, causing a physical change (Maier & Watkins, 1998). Long-term exposure to stress can result in depression (Nirmal, Babu, Harisudhan, & Ramanathan, 2008), post-traumatic stress disorder, and anxiety disorders (Kumar et al., 2013). An individual’s ability to control stress may determine the outcome(s) and consequences of that stressor. Additionally, effects may provoke the development of pathological behaviors after a traumatic event (Christianson, Thompson, Watkins, & Maier,
As stress increases, a situation or body signal may escalate or become habitual. Coping with stress becomes a requirement for survival (Kumar et al., 2013).

The mind/body connection may be a possible factor in producing a positive outcome. When the stress becomes problematic, the human brain becomes the target for various stressors due to the high sensitivity of stress-induced progressive conditions (Sahin & Gümüşlü, 2007).

While the brain may be capable of normalizing behavior, it does have limitations when stress is introduced. The brain’s tissue is composed of large amounts of polyunsaturated fatty acid, which makes it susceptible to stress attacks (Gutteridge, 1995). If these attacks continue, a patient may experience more dramatic consequences, which may require one’s defense mechanisms to commence. Kumar et al. (2013) discussed stress and dopamine within the following neurobiological parameters:

Stress-induced changes in dopamine (DA) levels within terminal areas seem to involve mainly ventral tegmental area projecting cells. Findings from preclinical studies suggest an uneven response of DA in different stressful stimuli. Specifically, an acute and controllable/escapable physical stress was seen to cause and enhanced DA efflux in the ventral striatum, whereas chronic and uncontrollable/inescapable exposure to the same stress attenuated DA release. (p. 93)

Brain epinephrine is used as an alarm to the body and decreases neurovegetative functions, which contributes to the accompanying increase in autonomic and neuroendocrine responses to stress (Tsigos & Chrousos, 2002). Norepinephrine also serves to alert the amygdala, the fear-related behaviors, and enhance long-term storage of emotional memories in areas such as the hippocampus and striatum (Kumar et al., 2013). Many brain regions are involved in the emotion of fear, specifically the limbic system, which regulates emotions and includes the hippocampus, amygdala, and prefrontal cortex (Mahan & Ressler, 2012; Myers & Davis, 2007). Moreover, monoaminergic systems aid in regulating the activity of the neurons within the amygdala.
(McGaugh & Roozendaal, 2002). As the amygdala is less responsive, fear and anxiety are less prevalent.

**Psychological and Physical Issues**

Recent advances in research related to mind-body interactions may make it possible to evaluate mental experiences in association with physical processes (Lindergren, 2012) which could be a helpful resource for research that aims to understand the correlations between physical and psychological experiences. From a psychological perspective, the brain is integral in receiving both external sensory input and internal input from the body (Lindergren, 2012). The body acts as the messenger for the brain, and the brain then directs the body as to how to react. The brain receives information, which is then integrated with past life experiences, individual genetic differences, and various contextual factors (McEwen, 2008; McEwen & Gianaros, 2011). Moreover, different individuals may experience the same sensory stimulation differently, as well as in different contexts (Lindergren, 2012). Therefore, it is important to understand the history of an individual’s experience in order to more clearly understand their mind-to-body connections. Scholars including Davidson and McEwen (2012) and McEwen & Gianaros (2011) have determined that the brain may control and regulate emotion, cognition, behavior, and physical responses as the body re-adjusts and balances. Based on these findings when physical touch is implemented, the body sends a signal to the brain that is then affected by past trauma and sends a message back to the body as a physical reaction such as tensing or relaxing. The body has the ability to maintain balance, even during physical change, which has a significant impact on the mind-to-body interaction (McEwen, 2008). Limited studies are provided regarding the mind-to-body responses during cancer treatment. Further research is needed to clarify whether repeated experiences of treatment could cause the mind and body to react in a
resisting response, to which the body may resist certain treatments causing the continuation of treatment. While it would be difficult to conduct a longitudinal study of a cancer patient using physical touch in treatment, transitioning to remission, being re-diagnosed, and re-conducting treatment to address previous treatment trauma and its effect on later treatment, that research is necessary.

Individuals who are living with cancer are at a higher risk of developing various psychological issues (Barre et al., 2015). A patient may experience psychological difficulties beginning with diagnosis, progressing throughout the treatment process, and even remaining after treatment. Research has shown that cancer patients suffer from both physical symptoms and psychological symptoms associated with diagnosis and treatment for the disease (Bultz & Carlson, 2006). Additionally, a cancer patient may experience psychological distress at various points throughout treatment (Barre et al., 2015). Extant studies are limited in the sense that, in some patients, psychological distress may not be self-recognized (Barre et al., 2015), while others may show signs early in treatment, and other patients post-treatment. The reason for such results is unclear; the patient could withhold information or be focused on the conclusion of treatment, thereby missing the psychological effects. It has been determined that patients do not always communicate their feelings or may not recognize when they are in distress (Mehnert, Lehmann, Cao, & Koch, 2006). When a cancer patient is diagnosed or engaging in treatment, there are certain areas of focus that require attention for the patient. Research has shown that, in addition to and separate from the fear of dying, when cancer patients feel threatened by interventions such as chemotherapy and radiation, they are concerned with their bodily integrity, independence, and social roles (Faller, Olshausen, & Flentje, 2003). Patients are vulnerable to these various physical and psychological effects and may not be aware of the negative impact
treatment creates. Therefore, future research should focus on both physical and psychological aspects for a patient undergoing treatment. The patient might have more positive results if intervention includes both physical and psychological factors, as compared to a purely physical treatment process that considers only the remission of the cancer cells. A patient’s psychological health may have more of an impact during treatment than previous research suggests.

**Quality of Life**

A patient’s quality-of-life (QOL) refers to their emotional, social and physical wellbeing, and their ability to function in everyday life (Ebbeskog & Ekman, 2001). A patient may experience a drastic change to their daily routine based on their diagnosis and prognosis. Within treatment, much of the focus from the medical staff is on the physical aspects of the cancer-related outcomes, and less focus accorded to the mental aspects of treatment (Barre et al., 2015). The oncology department does have a responsibility to address the patient’s physical disease to ensure a positive treatment outcome. Research conducted by Nayak et al. (2017) expressed that the quality of life of cancer patients is of major concern and interventions for patient empowerment and a sense of control throughout treatment is desired. Nandini, Sridhar, Usharani, Kumar, and Naveen (2001) created a holistic and comprehensive approach to cancer care to enhance QOL at the physical, emotional, social and a spiritual level. Nandini et al. (2001) indicated this approach provided a positive impact within treatment outcomes when integrating an approach focused on stress, symptom control, and QOL with the standard therapeutic regimens. Therefore, focusing on both psychological and physical aspects of patient care may provide a higher overall treatment outcome in terms of QOL. Additionally, the absence of touch could be linked to the impact of QOL, or the will to live, as evidenced by death rates for untouched infants (Hunter & Struve, 1998). Given the fatality rates of infants in the
Hunter and Struve (1998) study, touch may be crucial in moments of physical and psychological care across any age. Given the aforementioned research, physical touch may prove successful as an intervention to improve patient QOL.

**Physical Touch**

**Development of Physical Touch**

Hippocrates (460-377 BC) discovered that massage was an important medical treatment with several different effects: greater amounts of rubbing would thin the body; moderate rubbing would thicken the body; hard massage would constrict the tissues; and gentle massage would relax the body (Lindergren, 2012). Therefore, different forms of physical touch could be used for different conditions (Calvert, 2002), such as cancer. More specifically, holding hands as a form of physical touch may prove useful in creating the desired effects, such as reduced anxiety, within the treatment of cancer patients.

Touch is one of the most essential elements in the following areas: human development, the insight of communicating, the health and development of infants to adulthood, and healing (Bowlby, 1952; Harlow, 1971). From birth, touch can play an important role in one’s life. Additionally, research has suggested that physical stimulation (touch) is key to development and maintenance of both physical and psychological balance from infancy through adulthood (Field, 1998; Montagu, 1971). An infant is cradled in the caregiver’s arms, which can create a nurturing bond between the two. A New York hospital sought to understand the relation between mortality and touch. Findings suggested that when touch was implemented, the rate of mortality dropped from 30% to 10% (Cohen, 1987). This decrease in mortality through the use of touch should prompt further studies on the interaction between touch and patients’ mental status, as patient improvements were evident (Cohen, 1987). Moreover, adolescents may seek
comfort through the use of touch in moments of insecurity, while adults might seek touch in intimate areas of proximity. Touch is also common in shamanic and religious practices, and various healthcare / medical practices (Levitan & Johnson, 1986; Smith, Clance, & Imes, 1998).

Notably, Harlow (1958) defined touch for its importance in emotional, physical, and interpersonal development, as well as making an interesting distinction involving the role of skin and physical touch. The skin can be seen as the most important organ system of the body; unlike the other senses of the body, one may not survive without the physical and behavioral processes carried out by the skin (Montagu, 1971). Montagu (1971) also suggested that the longing for touch may result in abnormal behavior. Therefore, skin is paramount for human survival, while touch may be essential in the regulation of behavior. Based on these findings, both touch and the skin have a significant role in survival and normalizing behavior.

**Biological development of physical touch.** Describing the biological development of touch, Fosshage (2000) addressed the primitive nervous system and the tactile system, both of which are central to the early stages of human development. The primitive nervous system links skin cells in our rudimentary brain, and the tactile system is the earliest sensory system in the embryo to become functional (Fosshage, 2000). This early development is crucial, as it precedes that of the remaining senses in the body. Thus, touch is key to development of physical tendencies for infants; if development does not occur properly, psychological issues may occur. Moreover, studies on bonding suggest that infants with frequent touch in early developmental stages show higher results on physical, emotional, and interpersonal scales (Klaus & Kennell, 1976). Additionally, research on mother to infant interaction indicates that mutual influence and recognition is crucial for early development (Bloch, 2014). This development may be important
from a psychological perspective in reaching a secure attachment, which will be addressed later in this study.

**Cultural development of physical touch.** Heller (1997) explained the use of touch is diminishing with babies and children. Heller’s (1997) text credited this finding to the Western shift of a Puritan spirit, which teaches parents that by loving your children too much you are spoiling them. Therefore, parents are creating distance from their children, or not even hold/touch their children at all (Heller, 1997). This may account for many psychological issues, based on the importance of touch in early development. Additionally, it seems that social pressure and the value for independence or self-sufficiency may have caused American parents to distance themselves physically from their children (Mead, 1955). Despite Heller’s (1997) study specific to Western families, D’Agostino’s (2013) results indicate that positive touch may be seen as vital for human interaction and the process of bonding. Further, touch has many different meanings for different cultures, depending on socialization and individual experience (Halbrook & Duplechin, 1994). Mead’s (1955) research, then, may suggest that regardless of an individual’s cultural background or experience, physical touch is crucial at the early stages of development. The issue seems, at least within the Western culture, to revolve around the distorted perception of love and touch and how this impacts children. To address the distortion Tiffany Field has created the Touch Research Institute (TRI). The TRI informs the community the value of physical touch from infancy to senior citizens. The TRI has conducted over 100 studies focusing on the various forms of physical touch. Field’s (2003) research revealed how various forms of physical touch are critical for child growth and development and for adult overall well-being. The TRI colleagues are highly cited in more recent studies confirming the benefits of touch.
Forms of Physical Touch

Diverse forms of physical touch may be used when working with lymphoma patients. There is little to no literature on holding hands as a form of physical touch while treating lymphoma patients. Due to the lack of research on holding hands when treating lymphoma patients, research on other forms of physical touch will be used to substantiate the effectiveness of touch as used in cancer treatments, including both physical and psychological effects.

Physical touch and therapeutic touch. Physical touch is an important proximity behavior that reflects both physical and psychological closeness (Andersson et al., 2009). While research may suggest the effect of physical and psychological closeness (Andersson et al., 2009), it is important to understand the specifics of these outcomes. For instance, positive touch is indicative of protection, security, and human warmth (Johansson, 2013), which may allow an individual to feel psychological effects on an emotional level. In cases involving physical affect, skin-to-skin contact becomes a necessary component of nursing care (Carter & Sanderson 1995; Edwards 1998; Gleeson & Timmins 2005; Vortherms 1991). For the purpose of this study, related forms of physical touch will be explained to guide understanding of the physical and psychological effects created when physical touch is implemented.

Physical touch is an intrinsic component of nurse-patient interaction in most nursing professions (Routasalo, 1999). Touch is categorized as therapeutic or physical touch. Therapeutic touch is focused on a person’s energy field and involves no physical contact, while physical touch includes all other types of touch used in nursing, such as hand holding or massage therapy (Routasalo, 1999). When respecting a client’s uniqueness, dignity, wishes, and needs, using touch is seen as therapeutic (Goodykoontz, 1979; Hunter & Struve, 1998). Weber (1990) described a distinction between three different touch models: the physical-sensory model, the
psychological-humanistic model, and the field model. In the first model, touch is described as contact, while the second form is a way of reaching and communicating (Routasalo, 1999). The third form is a physical act of laying hands on an individual (Routasalo, 1999). Given these distinctions, the types of touch may be interchangeable in various cultural settings as well as philosophical situations. Thus, it is important to apply the correct term in the appropriate setting. Observation, questionnaires, bio-physical measurements, and various combined methods can be used in conducting research on the effects of touch (Routasalo, 1999).

**Healing touch.** Healing touch is used as a biofield therapy, although the extent to which healing touch is helpful for oncology outpatients lacks substantiation (Kemper, Fletcher, Hamilton, & McLean, 2009). This form of physical touch may at times involve physical contact, but primarily involves the hovering of hands above an individual. While the mechanisms for the effects of healing touch remain theoretical, case reports and clinical trials propose that it may be useful in relieving pain and anxiety (Kemper & Kelly, 2004; Wardell, Rintala, Duan, & Tan, 2006; Wardell & Weymouth, 2004). While healing touch has proved useful in several studies, research has not yet achieved a valid and reliable outcome as applied to treating cancer patients.

**Intentional comfort touch.** Intentional comfort touch can be applied with the intention of changing a patient’s emotions, including holding hands for comfort, as opposed to instrumental or procedural touch that has no intended emotional contact (Connor & Howett, 2009). The act of holding hands may create an emotional change for the individual going through cancer treatment, who often feels anxiety about the process (Connor & Howett, 2009). Connor and Howett (2009) provided an approach that can affect a patient’s emotions but does not refer to the physical aspects a patient may experience. Thus, it is necessary to address this
type of touch in future studies to measure the effects of anxiety, both physically and psychologically.

**Holding hands.** Hand holding as an intervention to manage anxiety has not been limited to the population of cancer patients undergoing treatment. Pirbudak and Tepe (2017) introduced hand holding in the context of gynecology procedures at the single case level, and all participants displayed positive effects in terms of pain and anxiety. Similarly, Ergott (2008) described a birthing experience in which vital signs were alarmingly low raising concern. Despite the efforts of the medical staff, Ergott (2008) believes it was the strength drawn from hand holding of the nursing staff that kept the mother alive throughout delivery. Based on the aforementioned research, the non-invasive intervention of holding hands during medical treatment appears to create positive effects for patients. Post diagnosis, the psychological side effects of non-Hodgkin’s lymphoma can affect patients’ overall wellbeing, future outlook, and relationships with others (Adler & Page, 2008).

Holding hands has a soothing effect, reduces anxiety, and provides the two engaging in the form of physical touch a feeling of increased security (Rubin, 1963). Rubin (1963) has addressed the effects of hand holding on anxiety in patients having cataracts surgery; the results indicated that patients engaged in hand holding experienced lower levels of anxiety than those of the control group, and that epinephrine levels were significantly lower as compared to the control group. Another study by Moon and Cho (2001) suggested that hand holding can be applied to relieve anxiety. Despite the lack of research specific to hand holding, the Moon and Cho (2001) study suggests the benefit of hand holding, and that it should be applied in further medical studies.

Maresh et al. (2013) measured both state and trait anxiety; their research indicates that
the role of social support through holding hands regulates emotional responses in anxious individuals. State anxiety is described as an unpleasant emotional stimulation in threatening demands or dangers (Schwarzer, 1997). Lazarus (1991) explains a threat must be experienced for the mind to appraise this emotion. Trait anxiety, however, reflects the presence of established individual variances in response with state anxiety in the expectation of threatening situations (Schwarzer, 1997). Additionally, Oh and Park (2004) found that both hand massage and hand holding are effective nursing interventions contributing to psychological and physiological anxiety alleviation for patients undergoing local infiltration anesthesia. Similarly, a phenomenological study of cancer patients undergoing treatment revealed that hand holding was a distraction from treatment, a source of security, and reduced pain through patients feeling more secure (Weekes, Kagan, James, & Seboni, 1993). Therefore, active engagement through holding hands with an individual with whom they are securely attached daily may prove useful for both patients and caregivers in managing the effects of anxiety for cancer patients.

**Massage touch.** The use of massage touch could produce physical, emotional, cognitive, and social effects (Gallace & Spence, 2010; Hertenstein, Holmes, McCullough, & Keltner, 2009; Loken, Wessberg, Morrison, McGlone, & Olausson, 2009; McCabe, Rolls, Bilderbeck, & McGlone, 2008; McGlone, Vallbo, Olausson, Loken, & Wessberg, 2007; Morrison, Loken, & Olausson, 2010; Olausson, Wessberg, Morrison, McGlone, & Vallbo, 2010; Rolls, 2010). An individual may experience one or more of these effects through this form of physical touch. Kunter et al. (2008) found that massage touch provided a way to interrupt emotional distress, and other factors such as a relaxation response and blood circulation. Despite these findings, the research explained the difficulty of creating randomized trials, and that, consequently, few studies have assessed the efficacy of massage touch (Kunter et al., 2008).
Research on Forms of Physical Touch

Research on different forms of physical touch will be outlined for more understanding of the physical and psychological effects produced during the treatment of lymphoma patients. Generally, research on touch has focused on three main aspects: the use of physical touch, the effects of physical touch, and a patient’s experiences with physical touch. Research conducted by Routasalo (1999) indicates that the results varied, but consistency was shown in that touch generally had a comforting and calming effect. Thus, the use of touch massage may be therapeutic and purposefully used as comforting (Lindgren, 2012). Holding hands may also prove useful in creating a comforting and calming effect for a lymphoma patient, though research is currently lacking in this area.

Early research on physical touch. Throughout time, touch has been suggested as essential for reproduction and survival (Grabenhorst & Rolls, 2011). More directly, touch can be seen as a necessity for humans. Additionally, the importance of touch may begin during infancy. Many have noticed how forms of touch influence weight, cognition, stress tolerance, and gene expression among newborns (Claessens et al., 2010; Dunbar, 2008; Field, 2002; Field, Diego, & Hernandez-Reif, 2010; Liu, Diorio, Day, Francis, & Meaney, 2000; Weaver et al., 2005). As influential as touch is among newborns, one might suspect the role of touch throughout life to be correlated to overall health. Lindergren (2012) clarified this point by explaining that touch is important from both evolutionary and developmental perspectives, as well as in healthcare. This may signify the importance of touch in both physical and psychological aspects for humans. Additionally, Connor and Hewitt (2009) contended that touch is important for both healthcare professionals and their patients. However, it is also important to identify specific areas touch can be used for within healthcare. Ruffin (2011) explained that touch has been used to treat stress,
insomnia, exhaustion, and constipation effectively since the late 1800s. While research has
developed more specifically since the 1800s, results remain limited in terms of comparative
studies.

**Responses to physical touch.** From a qualitative stance, there have been many positive
findings related to implementing physical touch into an individual’s treatment. More
specifically, physical touch has shown to decrease negative emotions such as anxiety, pain,
stress, loneliness, and meaninglessness, and to reduce psychological symptoms across a wide
variety of patients and symptoms (Andersson, Tornkvist, & Wandell, 2009; Beider & Moyer,
2007; Billhult, Lindholm, Gunnarsson, & Stener-Victorin, 2008; Billhult & Maatta, 2009;
Cronfalk, Ternestedt, & Strang, 2010; Diego, Field, Sanders, & Hernandez-Reif, 2004;
Falkensteiner, Mantovan, Muller, & Them, 2011; Henricson, Ersson, Maatta, Segesten, &
Berglund, 2008; Kim & Buschmann, 1999; Lamas, 2011; Lamas, Graneheim, & Jacobsson,
2012; Suzuki et al., 2010). A majority of extant research resulted in similar conclusions in that
physical touch creates positive psychological outcomes for an individual. However, each of the
aforementioned studies designed to reduce psychological symptoms concluded that further
research is necessary to investigate further patients and symptoms.

Observed responses during and after massage touch have contributed to various theories
of the effects of physical touch (Moyer, Rounds, & Hannum, 2004). One theory in particular
claimed that the hormone oxytocin (also known as the bonding chemical), is released during
touch or massage, and that the release of oxytocin may explain positive responses (Uvnas-
Moberg, 1998). However, several studies have failed to support oxytocin as a bonding agent
with regard to physical touch (Billhult, Lindholm, Gunnarsson, & Stener-Victorin, 2008;
Henricson, Berglund, Maatta, Ekman, & Segesten, 2008; Wikstrom, Gunnarsson, & Nordin,
2003), limiting the efficacy of findings regarding this effect. Oxytocin’s utility as an anti-stress marker has been doubted, due to the fact that stressful events increase the level of oxytocin produced (Semeniken, Merchenthaler, Hu, & Dudas, 2009). Thus, as anxiety increases, so does the release of oxytocin. Based on aforementioned research and conclusions, one may assume that, during anxiety, physical touch triggers the release of oxytocin as a way to de-escalate anxiety; however, research is limited.

Results of implementing physical touch as an intervention within the sections aforementioned quantitative research presented similar results to qualitative research, with few divergences. For instance, research has shown that massage touch may lower systolic blood pressure and heart rate for breast cancer patients (Billhult, Lindholm, Gunnarsson, & Stener-Victorin, 2009). However, more research is necessary due to conflicting results; studies should be conducted with larger sample sizes, and specifically designed so that stress can be measured both before and after treatments (Moraska, Pollini, Boulanger, Brooks, & Teitlebaum, 2010). Research has shown positive outcomes, but only with limited participants, which can weaken validity and reliability. With more measured outcomes, the results may produce different results than previous conflicting results. Responses to physical touch can be seen as beneficial in extant research; however, implementing physical touch in specific cases may show further results as to its effectiveness.

Physical Touch and Cancer Treatment

Previous research on physical touch in different types of cancer settings provides support for this study. Wardell and Weymouth (2004), conducted a review of existing studies, and concluded that touch results in reduced anxiety and pain, accelerated healing, some improvement in biochemical and physical markers, and an overall improved sense of wellbeing. Wardell and
Wymouth (2004) suggested that anxiety, stress, and accelerated healing are present during a cancer treatment regimen. Pain associated with advanced cancer has been known to cause physical and emotional distress, which can lead to decreased functional ability and quality-of-life (Kunter et al., 2008). In the study designed by Kunter et al. (2008), 380 patients with advanced cancer showed improvement in pain and mood immediately after a treatment when using a massage therapist, while the use of touch alone resulted in less improvement. Weekes, Kagan, James, and Seboni (1993) conducted a phenomenological study in which all 20 participants perceived hand holding to be an effective coping strategy in relieving treatment-related pain. More importantly, the participants preferred to hold the hand of their mother, although each would hold the hand of a nurse in the absence of their mother (Weekes et al., 1993). Lastly, the intervention of hand holding assisted the subjective experiences of the participants in feeling more secure, less tense, and provided a distraction from treatment (Weekes et al., 1993). The use of physical touch specific to hand holding in cancer treatment has proved beneficial and has provided evidence that who the participant holds hands with is equally important.

**Relationship Attachment**

John Bowlby (1969) conceptualized attachment theory as a model for social and developmental implications beginning from the stages of childhood and infancy. Attachment theory hypothesizes that an attachment system will evolve in order to maintain proximity between an infant and its caregiver when threatened (Bartholomew & Horowitz, 1991). Thus, the quality of an early attachment relationship is rooted in the degree to which an infant has become reliant on its attachment figure for security (Ainsworth, Blehar, Waters, & Wall, 1978). Additionally, attachment theory has suggested that humans have a tendency to make strong, affectionate bonds to significant others throughout their lives (Bowlby, 1977). The term
relationship attachment may be used to define these relationships. There are three distinct patterns of attachment: secure, anxious, and avoidant (Ainsworth et al., 1978). An individual within a secure attachment may find flexibility within the relationship. Those in an anxious-resistant relationship could be overly involved or scattered in the realm of emotions, while those who are avoidant may tend to avoid areas of conflict or even intimacy. Within relationship attachment, anxious and avoidant patterns could be seen indicators of stress and anxiety within a relationship, while a secure relationship attachment may indicate lower levels of stress and anxiety (Ainsworth et al., 1978; Bowlby, 1977).

Neurobiology with Relationship Attachment.

Within psychosocial oncology, the term adjustment is used to define the cognitive and behavioral mechanisms people use when faced with the threat to wellbeing affiliated with cancer diagnosis and treatment (Brennan, 2001). In many cases a patient may not know how to adjust emotionally to the diagnosis. In a psychological framework, adjustment relates to the emotional, social, and physical challenges that arise during psychological symptoms and quality-of-life disruptions (Nicholls et al., 2014). As these disruptions occur, an individual may adapt and progress or remain in the present adjustment. Moreover, psychological distress will not always lead to a diagnosable illness, but psychosocial factors can affect patients’ treatment outcomes, disease progression, and survival rates (Soler-Vila, Kasl, & Jones, 2003). While the research conducted by Soler-Vila, Kasl, and Jones (2003) is informative, it does not offer a clear interpretation on the statistical effects of physical distress. Therefore, further research is needed to better understand how and if levels of distress can affect treatment outcomes through comparative randomized studies with cancer patients.

Johnson et al. (2013) conducted a comparative study using functional magnetic resonance
imaging (fMRI) to scan a patient’s brain activity during a threat and determine how secure attachment may impact reactions in the following situations: patient left alone while having his or her ankles shocked; when a stranger was present holding the patient’s hand while the patient’s ankles were shocked; and when the partner of the patient was holding the patient’s hand while the patient’s ankles were shocked. Results from the fMRI showed more threat-related activity from the patient when alone than when a stranger was present holding the hand of the patient (Johnson et al., 2013). Moreover, the comparison between a stranger and the patient’s partner resulted in a greater threat of brain activity with a stranger present while holding hands and the patient’s ankles being shocked (Johnson et al., 2013). When a patient is holding hands with an individual with whom they experience a secure attachment, their brain’s threat detection may be lower than when shocks are administered when they are alone or with a stranger with whom they do not have a secure attachment.

**Relationship Attachment Styles**

**Anxious and avoidant attachment styles.** During the adjustment process in treatment, it is common for a patient to seek a relational attachment from another individual, during which maladaptive behaviors can occur (Nicholls, Hulbert-Williams, & Bramwell, 2014). Maladaptive behaviors consist of avoidant attachment behaviors and anxious attachment behaviors (Nicholls et al., 2014). When a threat is perceived, an avoidant attachment individual may seek close proximity with others, while the anxiously attached individual may withdraw and seek more independence. Both attachment styles may be classified as insecure attachment. Insecurely attached patients could have poorer results in terms of their psychological adjustment to cancer (Nicholls et al., 2014). In addition, studies have shown that insecurely attached caregivers may experience depression, stress, and less motivation towards caregiving (Nicholls et al., 2014).
When both patients and caregivers are experiencing an insecure attachment behavior, the outcome may be harmful as both resist connection leading to a secure attachment relationship.

**Secure attachment.** In contrast to the negative effects of anxious and avoidant attachment styles, secure attachment has shown to contribute to positive growth and better wellbeing (Nicholls et al., 2014). Secure attachment may produce positive effects in terms of a patient’s relationship attachment as well as for the use of positive growth emotionally and better wellbeing (Nicholls et al., 2014). While this attachment style may be used in many therapeutic settings, limited research has addressed secure attachment in relation to a cancer treatment setting.

**Summary of Review of Related Literature**

In relation to the relevant literature on physical touch, anxiety, relationship attachment, and non-Hodgkin’s lymphoma, two themes are most significant for the purposes this study. First, although holding hands is a form of physical touch, there is a lack of research measuring the effects created. Second, there is a gap in research that addresses the relationship between cancer patients holding hands to reduce anxiety, while administered by an individual with whom the patient is securely attached. While different forms of physical touch have been implemented into cancer treatment, extant studies have not taken into account the level of relationship attachment between the participants. The following three chapters present a new intervention for cancer patients being treated for non-Hodgkin’s lymphoma, addressing daily psychological anxiety during treatment through holding hands with a secure attachment during each treatment.
CHAPTER III:

METHODOLOGY

Chapter three will consist of the following topics: research questions and hypotheses, research design, participants, instruments, procedures, analysis of data, and summary. ¹

Research Questions and Hypothesis

Research Question One

Does hand holding with a secure attachment decrease the state and trait anxiety of non-Hodgkin’s lymphoma patients during treatment, as measured by the STAI (Speilberger et al., 1983)?

Hypothesis one. Participants utilizing hand holding with a secure attachment during treatment will display decreasing trends in both state and trait anxiety, as measured by the STAI (Speilberger et al., 1983).

Research Question Two

Does hand holding with a secure attachment during treatment decrease the state anxiety of non-Hodgkin’s lymphoma patients more compared to only having the secure attachment present during treatment, as measured by the STAI (Speilberger et al., 1983)?

Hypothesis two. Participants utilizing hand holding with a secure attachment will demonstrate lower levels of anxiety during treatment than when not hand holding in the presence of a secure attachment, as measured by the STAI (Speilberger et al., 1983).

Research Question Three

Does hand holding with a secure attachment during treatment decrease the state anxiety of non-Hodgkin’s lymphoma patients below the cutoff score of 39, as measured by the STAI (Speilberger et al., 1983)?

¹ Henceforth within the methodology, the terms patients and participants will be used interchangeably.
**Hypothesis three.** Participants utilizing hand holding with a secure attachment during treatment will display significant scores below the cutoff of 39 for state anxiety, as measured by the STAI (Spielberger et al., 1983).

**Research Design**

The focus of this study was comparing the effectiveness of hand holding with a secure attachment during non-Hodgkin’s lymphoma treatment in relation to patients’ state and trait anxiety levels. The researcher took recognition in that the recorded data points available were minimal; and thus assessed participants one through three using various single-case designs to strengthen the validity of the hand holding intervention. The phases utilized in these single case studies were priori, given the short amount of measures available; thus, only six chemotherapy measures and one CT scan meeting were completed. The CT scan meeting consists of the participants meeting with their oncologist to review the results and prognosis of their CT scan and future treatment regimen(s). Participant one underwent a monitoring B-design to evaluate the effects of hand holding during treatment. As the results were evaluated, it proved necessary to see how other participants would react to the intervention. Thus, the researcher used a B-A design for participant two and an A-B design for participant three. In total, three participants participated in the study to its completion.

According to Ray (2015), when using an A-B design, A (Phase A) refers to the baseline stage and B (Phase B) signifies the intervention stage. For the purposes of this study, during Phase A, the participant did not receive the hand holding intervention; within Phase B, the participant received the intervention of hand holding with the secure attachment. Within Phase A, if the data points show a stable trend of increasing or higher scores of anxiety, then Phase B would need to show lower scores to indicate significance. Since Phase A does not utilize the
intervention of hand holding with a secure attachment and Phase B does, this is why the trend direction has been decided as such. While the study has limited time points, there may be a lack in stable baseline for each participant. However, participants served as an autonomous control (Ray, 2015) for their respective measures, since their scores are independent of the population scores. Further, participants one and two were both measured under the same time frame except for the CT scan meeting. Participant three was measured under a different time frame given the different diagnosis. Engel and Schutt (2013) suggested that researchers must be able to measure a participant’s status at regular time intervals, such as hours, days, weeks, or months. Finally, following the Secure Attachment Protocol Form (Appendix E), the researcher took STAI measures (Speilberger et al., 1983) 30 minutes after the start of treatment and after the CT scan meeting.

**B-Design: Participant One**

The researcher used a B-design, which only has an intervention phase, for participant one. This design was used to determine how the participant progressed (Engel & Schutt, 2013) and to monitor the anxiety levels of participants across treatment and at the CT scan meeting. However, Engel and Schutt (2013) have explained that the actual improvement cannot be attributed to the intervention, as there may be threats to internal validity. Therefore, the researcher chose participant one to help identify any threats to internal validity, and provided a form of monitoring for the impact of particular interventions (Engel & Schutt, 2013), which would be compared to other participants time points. Specifically, if the researcher had used a standard A-B single-case design, it would be possible to argue that the effectiveness in reducing patient anxiety was not only due to hand holding, but perhaps due only to the presence of a secure attachment. Thus, the researcher used a B-design with participant one with the
intervention of hand holding with a secure attachment to help identify a target range of anxiety scores for the other participants. Again, no statistical significance can be drawn from a B-design, as a baseline measure is absent (Engel & Schutt, 2013). However, the data collected offered valuable information and direction in how to proceed with participants two and three. The researcher tracked participant one’s anxiety throughout five chemotherapy measures holding hands to create a trend, then the researcher measured the CT scan meeting, and concluded with one final chemotherapy measure. The last chemotherapy measure was used to see if the CT scan meeting affected the participant’s anxiety. This could be argued as a threat to internal validity, and raises the need for more participants using a different single-case design. Thus, the researcher used a B-A design on the next participant.

B-A Design: Participant Two

The researcher selected a B-A design to study the effectiveness of hand holding on participant two. A B-A design is used as a reversal from intervention to baseline, where the intervention is hand holding and the baseline is the absence of hand holding with the secure attachment present for treatment. As participant one had undergone a B-design, the researcher sought to further the understanding of hand holding on participant two. In the B-A design, the participant’s first measure was the CT scan meeting, followed by six chemotherapy measures. The CT scan meeting and the first three chemotherapy measures were undertaken in the presence of the intervention of hand holding with a secure attachment. Then the participant was placed into the baseline phase for the last three chemotherapy measures; the secure attachment was present, but hand holding did not occur. The participant agreed that the intervention of hand holding was beneficial and would be used going forward. While this design allows for
comparison between phases, it was still crucial to complete an A-B design on participant three under the same conditions as those used for participant two, regarding the CT scan meeting.

**A-B Design: Participant Three**

The researcher chose to study the effectiveness of hand holding on participant three using an A-B design, where the baseline of a secure attachment’s presence is first measured, then followed by the intervention of hand holding. Thus, participant three went through the CT scan meeting and the first three chemotherapy measures without holding hands, and then completed the three remaining chemotherapy measures holding hands. In both designs used for participants two and three, the use of repeated baseline measurements allowed the researcher to reduce threats to internal validity (Engel & Schutt, 2013; Ray, 2015). In either reversal design, due to the time-sensitive nature of the chemotherapy treatments, it was necessary to restrict the baseline phase to three sessions.

**Procedural Changes**

A procedural change arose in this dissertation when participant one had to move the CT scan meeting. The participant’s primary oncologist determines when a CT scan will occur, and the researcher desired for participant one to have the CT scan meeting between the first and last three chemotherapy measures to provide at least three measures on the baseline and intervention phases. With the adjustment to participant one’s CT scan meeting occurring after the fifth and before the sixth chemotherapy session, this caused an adjustment in selecting candidates for the two remaining designs. Thus, the researcher sought to control for this varying variable in future participants, as the results of the CT scan meeting could have an effect on the anxiety of participants. The researcher also wanted to have the CT scan meetings for participants two and three to occur between chemotherapy measures three and four. Since this was out of the control
of the researcher, it was easier to control time point chemotherapy measures if the CT scan meetings were moved to the initial measure for participants two and three. Lastly, the researcher desired another participant to undergo a B-design, where the participant would not hold hands with a secure attachment, but go through the CT scan meeting and the six chemotherapy measures just with a secure attachment present. However, this participant withdrew from the study. The Post Session Questionnaire (Appendix F), which is addressed in the next section, helped determine any variations from protocol. As data was collected after each measure, the researcher could make accommodations as needed.

**Instruments**

**Participant Screening Form**

The researcher used the Participant Screening Form (Appendix D) to clarify the following: that the patient has non-Hodgkin’s lymphoma in stages one-four; if a secure attachment is accessible by an individual, and to select a secure attachment who can be present at each treatment administered. Both the non-Hodgkin’s lymphoma patient and designated secure attachment completed this form. Secure attachment, as defined in this study, is the enduring emotional bond a person feels with another that results in the ability to manage anxiety. The selected person is identified throughout the study as *secure attachment*. Refer to Appendix A for more details.

**Secure Attachment Protocol Form**

The researcher provided the Secure Attachment Protocol Form (Appendix E) to the non-Hodgkin’s lymphoma patient’s secure attachment. The protocol form consists of duties to perform throughout the study. The researcher required the secure attachment to arrive for each session of chemotherapy, record responses directly from the non-Hodgkin’s lymphoma
participant on the STAI (Speilberger et al., 1983) not influence or challenge responses, and hold hands with the non-Hodgkin’s lymphoma participant during the intervention phase designated. Lastly, the secure attachment was required to complete the Post Session Questionnaire (Appendix F) after each measure, and return all documents to the researcher. Refer to Appendix B for more details.

**Post Session Questionnaire**

Secure attachments completed the Post Session Questionnaire (Appendix F) after the completion of the STAI (Speilberger et al., 1983). The questionnaire is designed to allow the secure attachment to explain the following: any deviation from the Secure Attachment Protocol Form (Appendix E), any external influence that may impact the STAI (Speilberger et al., 1983) results, and any personal reflection on the part of the non-Hodgkin’s lymphoma participant or the secure attachment. The questionnaires were returned to the researcher. Refer to Appendix C for more details.

**State-Trait Anxiety Inventory**

The researcher selected the State-Trait Anxiety Inventory (STAI; Speilberger et al., 1983) for this study for the purpose of distinguishing distress over time and how scores can change given support systems, overall health, and individual factors (Elliott, Shewchuk, & Richards, 2001; Shewchuk, Richards, & Elliott, 1998). The researcher purchased appropriate licenses to use the STAI (Speilberger et al., 1983) from Mind Garden. The purpose of this study was to measure anxiety over time as well as each participant’s active anxiety during treatment. Therefore, the STAI (Speilberger et al., 1983) was useful in assessing state and trait anxiety (Speilberger et al., 1983). Form Y is a version of the STAI that may be used in clinical settings to diagnose and differentiate anxiety symptoms from depressive symptoms (Speilberger et al.,
Further, Form Y is unique in that it differentiates state and trait anxiety within one assessment (Speilberger et al., 1983). Form Y consists of 40 total questions, and requires a sixth-grade reading level (Speilberger et al., 1983). Twenty of the questions pertain to state anxiety, to assess present anxiety symptoms, while the remaining twenty questions address trait anxiety, which is related to more personal traits. Each item is rated on a four-point Likert scale ranging from almost never, scored as one, to almost always, scored as four. Scores range from 20 to 80, with higher scores correlated with greater anxiety (Speilberger et al., 1983). Speilberger et al. (1983) reported internal consistency coefficients ranging from .86 to .95. Across a two-month interval, the test-retest reliability coefficients varied from .65 to .75. Lastly, Julian (2011) suggested a cutoff score of 39-40 is recommended to demonstrate clinical significance for state anxiety. Thus, the researcher determined participant scores exceeding 39 demonstrate more clinical anxiety at the state level and scores at 39 or below demonstrate the effectiveness of the intervention to reduce state anxiety clinical significance.

**Participants**

The study desired to have a criterion-based sample of up to ten participants with non-Hodgkin’s lymphoma, classified within stages one-four, at an oncology site in the mid-south. However, only three participants were selected out of the recruitment and screening process. While there are numerous sub-categories of non-Hodgkin’s lymphoma, any participant diagnosed under this category was eligible for admittance to this study. Upon the patient’s diagnosis, their primary oncologist asked the patient whether they would like to participate in the study. The researcher was in contact with a lead oncologist who treats lymphoma of all kinds, and provided the oncologist with contact information (phone number and e-mail address), and research description (i.e., consent), for dissemination upon approval by the patient. When a
patient agreed to participate in the study voluntarily, the researcher contacted the patient and provided all necessary information. This initial contact also enabled the researcher to determine whether the patient was eligible to participate in the study. Participants were required to meet the following criteria: (1) be diagnosed with non-Hodgkin’s lymphoma between stages one and four; (2) be 18 years of age or older, and speak / read English; (3) not be diagnosed with a previous lymphoma cancerous disease; (4) must be medically stable if mental health diagnosis present; (5) if a mental health diagnosis is present, stability is defined by regulatory psychotropic drugs prescribed by a primary oncologist and/or general physician; (6) have a secure attachment that who attend and make STAI (Speilberger et al., 1983) recordings; (7) and demonstrate clinical suitability for participation via the Participant Screening Form (Appendix D). Patients were informed that they could drop out of the study with no penalty or hindrance to their treatment regimen at any point.

In addition to the non-Hodgkin’s lymphoma patient, the patient’s secure attachments were asked to participate in the study. To become eligible for admittance into the study, the secure attachment was required to meet the following criteria: (1) attend each treatment with the non-Hodgkin’s lymphoma patient; (2) be 18 years of age or older, and speak / read English; (3) be able to hold the hand of the non-Hodgkin’s lymphoma patient; (3) be physically able to record responses given by the non-Hodgkin’s lymphoma patient; (4) and be willing / able to adhere to the Secure Attachment Protocol Form (Appendix E). The secure attachment could drop out of the study at any time with no penalty or hindrance to the self or the treatment process of the non-Hodgkin’s lymphoma patient.

To find suitable candidates to participate in the study, the researcher was trained in the technology portal used by the oncology staff. In using this portal, the researcher had access to
information including patient medical records, notes, and treatment regimens as a pre-screening method. Each week, the researcher would arrive at the oncology setting and run a patient visit report for the following week. Once the report was complete, the researcher would scroll through each list of scheduled patients to find those diagnosed with non-Hodgkin’s lymphoma. After finding the non-Hodgkin’s lymphoma patients, the researcher created an Excel file to track each patient by their medical number (MRN). The researcher then gave a list of potential candidates’ MRNs to a nurse on staff, who assisted the researcher with interpreting patients’ diagnosis and treatment regimens, as this was not in the researcher’s scope of practice. Once the researcher reviewed the list of potential candidates, the researcher would provide the appropriate oncologist with the patient MRNs to indicate research interest. The oncologist would determine whether the patient would be approved for candidacy before asking the patient to join the study. Once the oncologist received approval from a patient, the screening process continued with the researcher contacting the patient and discussing research interest. If the patient was interested, the researcher emailed the informed consent (Appendix C) and aforementioned documentation to the patient. Once the patient received all documents, the researcher contacted the participant to review each document over the phone.

The patient would then sign and hand deliver the informed consent (Appendix C) to the nursing staff for records keeping upon arrival of the first measure where all measurement materials were awaiting in their folder. The researcher created a participant folder, which consisted of enough STAI (Speilberger et al., 1983) forms and Post Session Questionnaires (Appendix F) for the participants to record for any remaining measures. Folders were given to the participants by the nursing staff for completion and returned to the nursing staff after each treatment. Folders were kept with the oncology research team, who are affiliated with the Mid-
South oncology center, in a secure location on-site until the researcher could arrive for collection of records. Once a participant completed all requirements, they received a gift card. The gift card was a 25-dollar gift card to the location/service of choice to the participant. Again, while the researcher desired 10 participants for the study, 19 possible participants were asked to join throughout the study. Out of the 19 potential participants, 12 declined to be included into the study. Within the remaining seven potential participants, all approved to be involved in the study. However, before measures could begin, four participants dropped out. Two of the four participants had to be removed from the study due to a diagnosis change (a more threatening cancerous disease needed to be treated before the non-Hodgkin’s lymphoma). The third participant had completed the CT scan meeting and started chemotherapy measures before deciding to withdraw from the study due to complications with the secure attachment being present. The fourth participant received news that there was no evidence of diseases and thus was removed from the study. Therefore, only three ($N = 3$) participants completed the study with the CT scan meeting and six chemotherapy measures.

**Participant One**

Participant two is a 61-year-old male who was diagnosed with stage three diffuse B-cell non-Hodgkin’s lymphoma. Information provided on the Participant Screening Form (Appendix D) indicated that the participant was married, Caucasian and Hispanic, and had no mental disorder diagnosis at the time of the study. During interview, the participant seemed eager to begin the study and wanted to give back to the field of cancer research. Further, this participant considered himself very active in his daily life, consisting of sports, business, and family time. The participant selected his wife as the secure attachment individual who would attend each time point measure. The secure attachment individual was fully committed to the study and
responsibility that followed. Lastly, the participant’s time points were recorded by the secure attachment at both the Mid-South oncology setting (North campus) and the hospital setting.

**Participant Two**

Participant two is a 70-year-old female who was diagnosed with stage two diffuse B-cell non-Hodgkin’s lymphoma. The Participant Screening Form (Appendix D) revealed that the participant was married, Caucasian / Non-Hispanic, and was given Duloxetine (30 mg) for diagnosed anxiety regularly. During the initial interview, the participant indicated that she was happy to assist in research and was in favor of the idea of hand holding during treatment. The participant expressed that she valued family closeness and support. The participant selected her husband as the secure attachment individual who would attend each time point measure. The secure attachment was fully committed to the study and responsibility that followed. Finally, the participant completed the CT scan meeting and treatments at both the Mid-South oncology setting (North campus) and hospital.

**Participant Three**

Participant three is a 71-year-old male who was diagnosed with unstagable (due to limited pathology) B-cell follicular non-Hodgkin’s lymphoma. It is important to note the researcher conferred with the lead oncologist and it was determined the participant would be treated for stage three, and thus included. Information on the Participant Screening Form (Appendix D) revealed that the participant was married, Caucasian / Non-Hispanic, and was taking Prozac to manage his diagnosed post-traumatic stress disorder (PTSD). During the interview process, the participant expressed that he was a calm person who did not experience much anxiety in life. Nevertheless, the participant was willing to aid in research and selected his
wife as the secure attachment individual who would attend each time point measure. Finally, the participant competed all measures at the Mid-South oncology setting (South campus).

**Context**

**Setting**

All participants received treatment and completed the CT scan meeting at either a Mid-South oncology setting or the affiliated hospital nearby. This oncology department had two locations each approximately 30 minutes apart, and hospitals minutes away from their North and South locations. Depending on where the participant lived, the North or South campus was used for treatment. Participant one and two each received two chemotherapy treatments at the North location and had a private room in which to receive treatment. Participant three received treatment in a private room at the South location. All CT scan meetings were conducted in a normal patient meeting room. Participants would arrive to the oncology setting and check in for their appointment. In future studies, researchers should become familiar with protocol of patient care at the selected setting. This will assist in tracking participants as they transition from one appointment to another.

**Procedures**

**Informed Consent**

The researcher received approval from the Institutional Review Board (IRB) of the University of Arkansas to conduct this study (Appendix A). Further, IRB approval was obtained from the local oncology department to screen and study the patients treated there (Appendix B). Upon acceptance into the study, the cancer patient and secure attachment were required to provide written informed consent (Appendix C) and complete the Participant Screening Form (Appendix D). Participants were informed that they may drop out of the study with no penalty or
hindrance to their already established treatment at any point. Finally, they were informed that inclusion in the study would not guarantee positive or negative results of their cancer treatment or psychological wellbeing, and that to abstain from participation would in no way impact their scheduled treatment regimen as prescribed by their oncologist.

**Sampling Procedures**

**Cancer patients.** Initially, each non-Hodgkin’s lymphoma patient being treated with chemotherapy met with their primary oncologist to explore the possibility of participating in this research study. Upon verbal consent from the patient to the oncologist, the oncologist collected the patient’s e-mail address and phone number for the researcher to make contact. The researcher then called each potential participant to explain the Participant Screening Form (Appendix D), and explained that the research would be conducted on a volunteer basis. Further, the patients were informed that if they participated in the study to its completion, they would receive a $25 gift card. The researcher sent an e-mail with the Participant Screening Form (Appendix D) for each patient and secure attachment to complete and to select a secure attachment to participate. Upon review of the Participant Screening Form (Appendix D), the accepted patients were considered study participants. This process was repeated for each new participant. Study enrollment was open for two months, in order to ensure that all participants begin the study within a reasonably similar time frame. The researcher in this study also served as the advisor and / or facilitator for this study.

**Secure attachment.** Once a non-Hodgkin’s lymphoma patient was accepted into the study, the researcher contacted the identified secure attachment provided by the patient on the Participant Screening Form (Appendix D) by phone. The researcher called the secure attachment to explain the Participant Screening Form (Appendix D), and then sent the Secure Attachment
Protocol Form (Appendix E) for the secure attachment to review and sign via email. The secure attachment was also informed of the volunteer basis of the study.

**Data Collection Procedures**

The researcher assigned patients involved in this study a confidential identification number to ensure anonymity and aid in data organization throughout the duration of the study. Upon receiving a signed copy of the informed consent (Appendix C), all participants and secure attachments completed the Participant Screening Form (Appendix D) to determine whether a secure attachment was present. Patients who reported the presence of a secure attachment—who could also attend the CT scan meeting and each chemotherapy measure—were selected for the study.

Measurements of the STAI (Speilberger et al., 1983) scores were recorded by the secure attachment across seven time points. The STAI (Speilberger et al., 1983) was administered 30 minutes through each chemotherapy treatment and after the completion of the CT scan meeting with the participant’s oncologist. The researcher chose for the assessment to be administered 30 minutes after the start of treatment, as some of the chemotherapy drugs make patients feel tired, and the researcher did not want to risk participants resting during times of measurement. Participant one underwent a B-design where measurements consisted of the intervention of a secure attachment present without holding hands across all time points. Treatments occurred daily for a week and are shown as time points one through five and seven. The CT scan meeting was taken at time point six, where the participant received the results at the Mid-South oncology center. Treatment began on a Monday, and the participant received two treatments in the same day: recorded as time points one and two. The first chemotherapy treatment, labeled as time point one, was recorded on a Monday at the primary Mid-South oncology center; the participant
then left the facility and traveled to the affiliated hospital to receive an afternoon treatment, indicated by time point two. Time points three, four, five, and seven were measured once a day until treatment concluded on Friday. Time point seven was recorded at the Mid-South oncology center following the CT scan meeting.

Participant two was directed under a B-A design where measurements consisted of the intervention of a secure attachment present while holding hands for the CT scan meeting and then the first three chemotherapy measures. Next, participant two completed the last three chemotherapy measures without holding hands. The CT scan meeting was held the week prior to the start of treatment. Treatments occurred daily for a week and are shown as measures two through seven. The participant received two treatments in the same day, which are recorded as time points two and three. The first chemotherapy treatment (time point two) was recorded on a Monday at the primary Mid-South oncology center, and the participant would then exit the facility with the secure attachment and travel by car to the affiliated hospital to receive an afternoon treatment, followed by four single daily treatments; Friday was the last treatment received back at the Mid-South Oncology center.

Participant three was measured under an A-B design, where Phase A consisted of the CT scan meeting and the first three chemotherapy measures without holding hands with a secure attachment. Phase B consisted of the last three treatments holding hands with a secure attachment. Participant three received treatment on Wednesdays for three weeks and then had the fourth week off treatment. The CT scan meeting was recorded the week prior to the start of treatment. All time points were measured at the Mid-South oncology setting.

Across all groups, 30 minutes after the chemotherapy began, the secure attachment began the STAI (Speilberger, et al., 1983; Appendix G). The secure attachment, in compliance with the
Secure Attachment Protocol Form (Appendix E), recorded the participant’s scores. As circumstances of the treatment process can vary, given extraneous or uncontrollable variables, the secure attachment completed the Post Session Questionnaire (Appendix F) to identify any variation from the Secure Attachment Protocol Form (Appendix E) or unforeseen circumstances when recording anxiety. The Post Session Questionnaire (Appendix F) enabled the secure attachment to explain how the non-Hodgkin’s lymphoma participant’s anxiety may be affected in circumstances including but not limited to: the death of a family member, loss of job, relationship distress, and financial distress related to insurance, or seeing another patient receiving treatment.

The researcher has utilized the term *time point*, to refer to the recorded measures across phases of each single-case design. As each participant underwent a different single-case design, attended the CT scan meeting at a different time, and utilized the intervention of hand holding within different phases, the time point recorded merely symbolized the first through seventh measure. Thus, the first STAI (Speilberger et al., 1983) recorded, regardless if it was a treatment or CT scan meeting, is placed within time point one, and so-forth. The secure attachment recorded the participant’s scores using their dominant writing hand, while holding hands with the participant with the opposite hand. Participants were instructed to continue holding hands throughout the entirety of the treatment, and to note in the Post Session Questionnaire (Appendix F) if any deviation occurred. All assessments completed were returned to the nursing staff; the assessments were then kept in a secure and confidential file for the researcher to retrieve. The nursing staff was not directly involved in the study and therefore could not explain any information to the participant, or answer questions about the study when results were completed. The secure attachment was present at each measurement point for all participants. To better
understand the process each group was to follow, instructions from the informed consent (Appendix C) are provided in the following sections.

**Participant one.** Participant one went through all seven measures while holding hands with a secure attachment. Participant one followed the following detailed protocol within the informed consent.

1. Your secure attachment person will attend each treatment.
2. The secure attachment will read the STAI to you and record answers 30 minutes after the start of treatment and at the completion of the CT scan meeting.
3. The STAI will be given at chemotherapy treatments 1, 2, 3, 4, 5, and 6.
4. Hold hands with your secure attachment throughout every treatment.
5. The STAI will be given after your CT scan meeting with your oncologist.
6. Hold hands with your secure attachment during the meeting.
7. After each STAI, participants will complete the Post Session Questionnaire. This will explain any influence on your anxiety.
8. All results will be collected.

**Participant two.** Participant two went through the first four measures holding hands. During the last three measures, the participant did not hold hands. The detailed protocol listed in the informed consent form for participant two was:

1. Your secure attachment person will attend each treatment.
2. The secure attachment will read the STAI to you and record answers 30 minutes after the start of treatment and at the completion of the CT scan meeting.
3. The STAI will be given at chemotherapy treatments 1, 2, 3, 4, 5, and 6.
4. Hold hands with your secure attachment throughout treatments 1, 2, and 3.
5. Do not hold hands with your secure attachment throughout treatments 4, 5, and 6.

6. The STAI will be given after your CT scan meeting with your oncologist.

7. Hold hands with your secure attachment during the meeting.

8. After each STAI, participants will complete the Post Session Questionnaire. This will explain any influence on your anxiety.

9. All results will be collected.

**Participant three.** Participant three went through the first four measures without holding hands. During the last three measures, the participant was instructed to hold hands. The detailed protocol listed in the informed consent form for participant three was:

1. Your secure attachment person will attend each treatment.

2. The secure attachment will read the STAI to you and record answers 30 minutes after the start of treatment and at the completion of the CT scan meeting.

3. The STAI will be given at chemotherapy treatments 1, 2, 3, 4, 5, and 6.

4. Do not hold hands with your secure attachment throughout treatments 1, 2, and 3.

5. Hold hands with your secure attachment throughout treatments 4, 5, and 6.

6. The STAI will be given after your CT scan meeting with your oncologist.

7. Do not hold hands with your secure attachment during the meeting.

8. After each STAI, participants will complete the Post Session Questionnaire. This will explain any influence on your anxiety.

9. All results will be collected.

Any deviation from the group instructions was recorded in the Post Session Questionnaire (Appendix F).
Analysis of Data

All participants were analyzed using the following methods when appropriate: comparing participants’ state and trait anxiety trends, assessing the state anxiety cutoff score of 39 (Julian, 2011), conducting visual analysis, using both percentage of non-overlapping data (PND) and percentage of all non-overlapping data (PAND) for statistical analysis, making reference to any adverse events that occurred, and conducting a follow-up interview. Participant one was excluded from the statistical analysis of PND and PAND, as there was not a baseline measure recorded. The secure attachments scored the STAI (Speilberger, et al., 1983; Appendix G) by hand as instructed within the assessment tools. The researcher collected the results in an Excel file, and made calculations, graphs, and tables for each participant. Table 1 provides information regarding time points recorded per phase for each participant’s protocol throughout the study.

Table 1

Participant Protocol Across Phases

<table>
<thead>
<tr>
<th>Participant</th>
<th>Baseline (A-Phase)</th>
<th>Intervention (B-Phase)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n measures)</td>
<td>(n measures)</td>
<td>(n measures)</td>
</tr>
<tr>
<td>One</td>
<td>0</td>
<td>7</td>
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<tr>
<td>Two</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Three</td>
<td>4</td>
<td>3</td>
<td>7</td>
</tr>
</tbody>
</table>

Note: n measures are the total recorded measures per phase.

State and Trait Anxiety Trend Comparison

Speilberger et al. (1983) have defined trait anxiety as traits of one’s personality, which describe individual differences when compared to immediate state anxiety. Thus, each
participant’s trait anxiety scores should serve as a measured normative personality trait. If the state anxiety scores are above the trait anxiety scores, it is evident that the situation causing the anxiety is greater than that of the person’s personality trait. If the state anxiety scores are lower than the individual’s trait anxiety scores, then the person is experiencing less anxiety compared to their personality norm. The researcher compared each participant’s state and trait anxiety scores across time points.

**State Anxiety Cutoff Score**

To determine clinical significance for each participant, the researcher determined a cutoff score. The range of scores for the STAI (Speilberger et al., 1983) is 20-80 for each subtest, with the higher score indicating greater anxiety (Julian, 2011). Julian (2011) recommended that a cutoff score of 39-40 should be used to detect clinical significance symptoms for the state-anxiety of a participant; for the purposes of the present study, the researcher selected a cutoff score at or below 39 to demonstrate scores above represent state anxiety clinical significance. The cutoff score was used to help remove subjective interpretation of the results, particularly for participant one, as there was not a baseline measure to compare. The scores for each participant’s trait anxiety reflect what their normal anxiety levels would be if the threatening situation (in this case, treatment) were removed.

**Visual Analysis**

The researcher employed visual analysis of graphed data to determine intervention effectiveness. Each participant was analyzed independently, although commonalities and differences between participants became evident through visual inspection. As mentioned previously, participant one was measured under a B-design; as Engel and Schutt (2013) explained, in this case, the actual improvement cannot be attributed to the intervention, as there
may be threats to internal validity. Recognizing this issue, the researcher used the cutoff score as a comparison across all measures for participant one. For participants two and three, to produce reliable and valid visual analysis results, it was necessary to meet a number of baseline data standards within Phase A (Smith, 2012). Baseline qualification standards, at a minimum, require Phase A to meet the following stipulations: be relatively stable and free of significant trend with focus in the opposite hypothesized direction of intervention, display minimal overlap of data with subsequent phases, and provide ample sampling of behavior to meet constraints (Franklin, Gorman, Beasley, & Allison, 1997; Parsonson & Baer, 1978).

To provide justification for the selection of visual analysis, Parker, Cryer, and Byrns (2006) suggested that visual analysis could accomplish more than statistical analysis in single-case designs. Currently, there is no statistical technique that can concurrently reflect data variability, trend degree and trend, mean levels and changes, embedded cycles (e.g., weekly), and abrupt changes in results at the point of intervention (Parker et al., 2006). Visual analysis allows researchers to detect the direction of change, specifically how the intervention influenced the effect size (Parker et al., 2006). Moreover, the standard use of visual analysis for single-case study designs, and which was used for this research, involves examining the overall graph and considering the following four steps and six outcome-measure features (Kratochwill et al., 2013; Parsonson & Baer, 1978). Step one is documentation of a predictable and stable baseline pattern (Kratochwill et al., 2013). Step two requires examining within-phase data patterns through the assessment of level, trend, and variability (Kratochwill et al., 2013). Step three consists of comparing the data in the baseline phase to that in the intervention phase to assess whether manipulation of the independent variable produced an effect (Kratochwill et al., 2013). This is done by assessing level, trend, variability, the immediacy of effect, overlap, and consistency of
Ray (2015) defined immediacy of the effect as how quickly the intervention demonstrates an effect. Specifically, the focus is on the change in the last three data points in one phase and first three in the intervention phase (Kratochwill et al., 2013); the more rapid the effect, the more persuasive the results are due to the manipulation of the independent variable (Kratochwill et al., 2013). Overlap involves the comparison of data from Phase B with the data that overlaps with data in Phase A (Ray, 2015). Kratochwill et al. (2013) specified that the smaller or, conversely, the greater the non-overlap, the more convincing the evidence of an effect. This information was calculated using both percentage of non-overlapping data and percentage of all non-overlapping data, which is explained in the following statistical analysis section. Lastly, consistency of data patterns across similar patterns includes analyzing data from all phases within the same condition, and examining the consistency in the data patterns from similar conditions. Step four compares level, trend, and variability between subjects to verify replication of effect (Kratochwill et al., 2013). Given participant one’s absence of a baseline measure, the researcher only compared Phase B. The researcher used this basic effect measure for participants two and three.

**Individual Participant Statistical Analysis**

Participant one did not meet the criteria of having a baseline measure to compare and was excluded from statistical analysis. Participants two and three were measured under baseline and intervention conditions, and have a different setting measure (CT scan meeting). Therefore, the researcher desired to account for any possible variability in the data. The researcher measured statistical analysis for state and trait anxiety across all time points (one through seven). Additionally, the researcher conducted statistical analysis for state and trait anxiety across only
the time points where a participant received treatment (two through seven). This was necessary to help differentiate data specific to research questions.

**Percentage of non-overlapping data.** In addition to visual analysis, the researcher used a common non-regression approach used in single-case research called the percentage of non-overlapping data (PND; Scruggs & Mastropieri, 2001). Calculating the PND allows for a meaningful index of intervention effectiveness (Scruggs & Mastropieri, 2001). To calculate PND, the researcher calculates the percentage of recorded data points during the intervention phase(s) that surpasses the highest value in the baseline phase (Scruggs & Mastropieri, 1998). However, for participants two and three, the researcher measured the percentage of data points in the intervention phase that fell below the lowest baseline measure. The step-by-step procedure used to calculate PND included:

- Identify intended change (increase or decrease in scores) in the data from baseline phase to treatment phase.
- Identify the greatest or least datum point in the baseline phase (on the therapeutic side). Select the greatest point of goal of treatment is to decrease scores and the least if goal is to increase scores.
- Draw data line from the datum point identified in Step 2 that extends through the treatment phase.
- Count the number of data points above or below the line (on the therapeutic side) drawn in Step 3.
- Divide the count from Step 4 by the total number of data points in the treatment phase.
- Interpret the effect size (Lanz, 2013).
**Percentage of all non-overlapping data.** While the PND method offers important results, percentage of all non-overlapping data (PAND) uses a ratio-based analysis within the non-overlap data between phases (Lenz, 2013). When at least 20 observations are recorded, the use of PAND is a way to reveal a robust measure of effect size (Lenz, 2013; Parker, Hagan-Burke, & Vannest, 2007). While this study does not meet the criteria of at least 20 observations, PAND did produce different results than the PND method and the researcher determined it to be useful. Lenz (2013) explained that using PAND allows the researcher to create equal marginal proportions not achieved using PND and percentage of data exceeding the median (PEM). Parker et al. (2007) also noted that limitations of the PAND method are similar to PND, as it includes sensitivity to outliers and the inability to control for positive trends found in the baseline phase (Lenz, 2013). The researcher used the following procedure for calculating PAND:

- Identify intended change
- Sum the total number of data points in baseline and treatment phases
- Draw a line to identify the minimum number of data points needed to eliminate the overlap between the baseline and treatment conditions
- Count the number of data points removed from the treatment condition to eliminate all overlap
- Subtract the total number of data points removed to eliminate overlap from the total number of data points
- Divide the value from Step 5 by the total number of data points identified in Step 2
- Interpret the effect size (Lanz, 2013).

Scruggs and Mastropieri (1998) have suggested that PND and PAND scores above .90 are very effective treatments; scores ranging from .70 to .89 are moderately effective treatments; scores
ranging from .50 to .69 are debatably effective; and scores less than .50 are deemed ineffective. Thus, the researcher was seeking scores within the very effective range to help determine significance for the effects.

**Analysis of Within-Condition and Between-Conditions**

Lane and Gast (2013) provided a step-by-step guide for calculating within-conditions and between-conditions analysis; for the purposes of the present study, the researcher used this method for all participants. The researcher used the following guide to calculate the within-condition analysis:

- Step 1 is assessing a letter to each condition (i.e., A-B-C notation)
- Step 2 is counting the number of sessions for each condition
- Step 3 is calculating the mean, median, range, and stability envelope of data for each condition
- Step 4a is calculating level change within each condition
- Step 4b is calculating the difference between the first and last value within each condition
- Step 5 is calculating trend using the split-middle method of trend estimation
- Step 6 is calculating the percent of data points within the stability envelope for each condition
- Step 7 is using the freehand method to evaluate data paths (Lane & Gast, 2013).

To calculate between-condition analysis, the researcher used the following guide:

- Step 1 is determining the number of variables that changed between conditions with a focus across conditions
• Step 2 is identifying trend direction across adjacent conditions as accelerating, decelerating, or zero-celerating

• Step 3 is comparing the decision from Step 6 from the within-condition analysis section to Step 2 of the between-condition analysis section

• Steps 4a-d are evaluating (a) relative, (b) absolute, (c) median, and (d) mean level change

• Steps 5a-b are calculating percent of non-overlapping data (PND; Lane & Gast, 2013) and percent of all non-overlapping data (PAND).

However, limitations are present within these methods. Lane and Gast (2013) have explained that relative level change focuses on median change but does not account for immediacy of change. Further, absolute level change only focuses on immediacy of change from the final baseline measure to the first intervention measure and excludes other measures recorded (Lane & Gast, 2013). Therefore, the researcher chose to include both absolute level change and mean level change too account for both the immediacy of the effect and potential outliers (Lane & Gast, 2013).

The researcher analyzed participant one using the within-conditions of absolute level change of Phase B (Lane & Gast, 2013). Within the intervention phase, the researcher evaluated level, trend, and variability for state and trait anxiety under three circumstances: time points only recorded during treatment prior to the CT scan meeting (time points one through five), time points only recorded during treatment (time points one through five and seven), and across all time points, which includes the CT scan measure (time points one through seven). The purpose of this method was to differentiate the effects the CT scan meeting may have had on time points before and after. As no baseline measures were recorded for participant one, visual analysis was
limited. Using the guide provided by Lane and Gast (2013), the researcher calculated only absolute level change for participant one, but absolute and mean level change for participants two and three. For participants two and three, the researcher completed visual analysis and statistical analysis.

**Adverse Events**

The researcher instructed each participant to follow the instructions within the Secure Attachment Protocol Form (Appendix E). If any variation or violation occurred, the participant was asked to have the secure attachment individual complete the Post Session Questionnaire (Appendix F) to account for circumstances. These responses were completed after each of the seven measures recorded and would help the researcher identify any scores that may be influenced beyond the control of the participant during treatment.

**Follow-up Interview**

After each participant completed the study, the researcher conducted a brief unstructured follow-up interview over the phone. Questions were informal and related to the patients’ overall experience in the study, how the patient felt hand holding impacted their anxiety during treatment compared to the absence of hand holding (excluding participant one), and any closing thoughts they wanted to offer. Participants were informed that they did not have to participate in the interview. The researcher decided to use a follow-up interview to better understand the participants’ narrative experience to compare this with the data collected. Given the limited data points collected for each participant, the interview provided the researcher with concrete information to assist in the analysis of data.
CHAPTER IV: RESULTS

The participants’ secure attachments recorded measures as instructed on the Secure Attachment Protocol Form (Appendix E) at each time point; any deviations that occurred were recorded on the Post Session Questionnaire (Appendix F). Results for each participant were analyzed independently using: a state and trait anxiety trend comparison, the state anxiety cutoff score of 39, visual analysis, both PND and PAND for statistical analysis, and a follow-up interview. Participant one did not record any baseline measures and was excluded from statistical analysis. This chapter consists of focus on each participant independently, as the researcher used multiple single-case designs for the purposes of this study. Table 2 provides the means, standard deviations, percentage of non-overlapping data (PND), and percentage of all non-overlapping data (PAND) for state and trait anxiety scores across each phase.

Table 2

<table>
<thead>
<tr>
<th>Participant</th>
<th>State Anxiety</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
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<tr>
<td></td>
<td>$M^a$</td>
<td>$SD^a$</td>
<td>$M^b$</td>
<td>$SD^b$</td>
<td>PND</td>
<td>PAND</td>
</tr>
<tr>
<td>One</td>
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<td>5.98</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two</td>
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<td>0.57</td>
<td>26.25</td>
<td>6.23</td>
<td>1.00</td>
<td>1.00</td>
</tr>
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<td>Three</td>
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<td>1.70</td>
<td>36.33</td>
<td>1.52</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note: $M^a$ = mean of baseline phase; $M^b$ = mean of intervention phase; $SD^a$ = standard deviation of baseline phase; $SD^b$ = standard deviation of intervention phase; PND = percentage of non-overlapping data; PAND = percentage of all non-overlapping data. Decreased average scores indicate improvement.

Table 3 provides the means, standard deviation, PND, and PAND for trait anxiety within each phase.
Participant One

Participant one is a 61-year-old male who was diagnosed with diffuse B-cell non-Hodgkin’s lymphoma. Participant one completed a B-design single-case design where the intervention of hand holding with a secure attachment was present for time points one through seven. All measures were recorded by the secure attachment over the course of five days. The raw data of state anxiety are as follows: 30, 24, 39, 29, 31, 30, and 22 (M = 29.28, SD = 5.98). The raw data of trait anxiety are as follows: 36, 34, 42, 31, 34, 30, and 30 (M = 33.85, SD = 4.27).

State and Trait Anxiety Trend Comparison

Initial evaluation of the state and trait anxiety results demonstrated that data were paralleled across all time points; as state anxiety increased or decreased, so did trait anxiety. The intervention phase (B) is noted as the B-Phase within the graph (see Figure 1). State anxiety decreased more than trait anxiety at time points two and seven. Lastly, at the CT scan meeting
(time point six), the scores were matching. Figure 1 provides a graphical illustration of data collection for participant one within the respective single-case design.

![Participant One](image)

*Figure 1. Participant one’s trend comparison for state and trait anxiety.*

**State Anxiety Cutoff Score**

All state anxiety results remained under the cutoff score of 39, with the exception of the third chemotherapy treatment (time point three) with a score of 39, demonstrating the absence of state anxiety clinical significance (Julian, 2011). Results based on the cutoff score indicate clinical improvement for the use of hand holding with a secure attachment.
Visual Analysis

Within visual analysis of the data, absolute level change of state anxiety results are as follows: time points one through five showed an increase (+1) in anxiety; comparing all treatment time points, there was a decrease in anxiety (-8); and across all time points, there was a decrease in anxiety (-8). Absolute level change of trait anxiety results are as follows: time points one through five showed a slight decrease in anxiety (-2); across all treatment time points, there was a decrease in anxiety (-6); and across all time points there was a decrease in anxiety (-6). Trend analysis indicated that there was a decreasing trend for both state and trait anxiety when measured across all time points and all treatments. There was a small increase in trend in the first five treatment time points. Analysis of variability showed moderate variability across all time points for both state (M = 29.28, Range = 22 – 39, SD = 5.98) and trait anxiety (M = 33.85,
Range = 30 – 42, SD = 4.27). Variation specifically occurred between time points two through four for both state and trait anxiety, indicating a potential adverse event.

![Participant One Trend](image)

*Figure 3. Participant one’s linear comparison for state and trait anxiety.*

**Adverse Events**

When reviewing the Post Session Questionnaire (Appendix F), the researcher identified the presence of adverse events. The participant recorded consistent interruptions by medical staff for monitoring, and that there were “…nurses interruptions with lights, etc.” throughout treatment, which caused the participant to break hand holding with the secure attachment. The secure attachment individual expressed that she was “Working hard on getting [the participant] to relax.” The necessary interruptions by the medical staff may account for this variation in data. The participant also revealed that the CT scan meeting was a “very emotional, but positive”
experience, which may account for the decrease in time point seven for state anxiety and stability in trait anxiety. Results of the CT scan meeting revealed no evidence of disease but that maintenance treatment would continue. At the third time point, the participant noted that he struggled to sleep the night before and was not feeling well. Specifically, the participant wrote: “It was a rough night, and my body is going through a lot…loss of hair and weight.” This information was important to note as it may have skewed the data. Moreover, while this may be similar to what other cancer patient’s experience, it appears to have had an impact on the participant’s anxiety as indicated by the state (39) and trait (42) anxiety scores.

**Follow-up Interview**

During the follow-up interview, the participant explained, with regard to the overall experience of hand holding during treatment, that: “It was such a blessing to have my wife with me and for her to experience this with me by holding hands. Even after treatment ended, we would continue to hold hands at home any time I felt anxious.” The researcher asked the participant how hand holding impacted his anxiety during treatment, and the participant stated: “You know, I got to say it was quite relaxing….it brought me a sense of calm and rest while I received treatment….I knew I was safe with my wife holding my hand.”

**Participant Two**

Participant two is a 70-year-old female who was diagnosed with diffuse B-cell non-Hodgkin’s lymphoma. Participant two completed a B-A single-case design where the intervention of hand holding with a secure attachment was present for time points one through four. For time points five through seven, baseline measures were taken without hand holding, but the secure attachment was present in the treatment room recording results. All measures were recorded by the secure attachment daily for five days. The raw data of state anxiety are as
follows: 33, 30, 22, 20, 43, 42, and 42 (M = 33.14, SD = 9.67). The raw data of trait anxiety are as follows: 24, 20, 23, 23, 26, and 29 (M = 23.57, SD = 3.20).

**State and Trait Anxiety Trend Comparison**

Participant two displayed a steady increasing trend across all trait anxiety time points. The intervention phase (B) is noted as the *B-Phase*, and the baseline phase (A) is labeled as *A-Phase* (see Figure 4). A noticeable variation of trait anxiety scores occurred between time points one (24) and two (20), which is to be expected as these are two different conditions: the CT scan meeting and treatment. Despite the change in treatment setting, the trait anxiety during treatment continued to increase over time. Time point one was measured in a typical doctor-patient meeting room where the participant received the results of the CT scan. Time point two was taken within the chemotherapy room at the Mid-South oncology setting. Time points three through seven were recorded within the affiliated chemotherapy hospital setting. Assessing the trend of state and trait anxiety through visual analysis, time points one and two parallel (Trait – 24, 20; State – 33, 30) each other before closing in at time point three (Trait – 20; State – 22) and crossing at time point four (Trait – 23; State – 20). These measures were taken while the intervention of hand holding with a secure attachment occurred. The state anxiety scores greatly declined with the presence of the intervention. This is important to note, as the trait anxiety of the participant was lower than the state anxiety across all measures except time point four. After the intervention was removed at time points five through seven, the state anxiety steadily declined as the trait anxiety increased. This comparison of trait anxiety may indicate that the participant became increasingly anxious as a personality trait within the cancer treatment setting. When receiving treatment, scores are manipulated given the presence or absence of the intervention. Therefore, the intervention appears to assist the participant’s state anxiety towards
her trait anxiety, while the absence of the intervention both increased her trait anxiety and her state anxiety (see Figure 4).

\[\text{Figure 4. Participant two’s trend comparison for state and trait anxiety.}\]

**State Anxiety Cutoff Score**

As recommended by Julian (2011), a cutoff score of 39-40 should be used to detect clinical significance symptoms for the state-anxiety of a participant. The cutoff score at or below 39 was used to determine intervention significance for participant two. The raw data for the intervention phase (B) are as follows: 33, 30, 22, and 20; scores for the baseline phase (A) are as follows: 43, 42, and 42 (see Figure 5). Results based on the cutoff score indicate state anxiety clinical significance for A-Phase but not B-Phase. It is also important to note that the lack of the intervention in A-Phase, where the secure attachment was present but not holding the patient’s
hand, the patient’s mood was stable across time points five through seven. This stability indicates that the effect of a secure attachment’s presence was useful, but did not produce as significant an effect for the participant as holding hands during treatment.

![Participant Two State Anxiety Graph](image)

**Figure 5.** Participant two’s state anxiety cutoff score.

**Visual and Statistical Analysis**

As this participant completed measures under a B-A single-case design, significance is based on the results of the A-phase trend. For state anxiety, level analysis revealed a mean increase from the intervention phase to the baseline phase (B-Phase M = 26.25; A-Phase M = 42.33). Level analysis for trait anxiety revealed a mean increase across phases (B-Phase M = 21.75; A-Phase M = 26). State anxiety changed from a decelerating-improving trend during the intervention before a significant increase in anxiety and minimal decelerating-improving trend.
during the baseline measures. Trait anxiety changed from a decelerating-improving trend during the intervention to accelerating-deteriorating trend during the baseline. Analysis of variability revealed moderate variability for state anxiety (M = 33.14; Range = 20 – 44; SD = 9.66) and minimal variability for trait anxiety (M = 23.57; Range = 20 – 26; SD = 3.20) across the intervention and baseline phases.

However, a large difference in scores for state anxiety appeared within the transition between phases, indicating the potential and immediate effect of the intervention on the participant. Compared to the last data point in the intervention phase of state anxiety, data noticeably increased, starting with the first data point in the baseline phase, indicating an immediate treatment effect. Within trait anxiety, however, the last data point of the intervention and the first data point of the baseline were equal. It was not until the second baseline measure that results displayed an effect on the participant’s trait anxiety. Through visual analysis, the researcher determined that the results do not indicate overlap of data for state anxiety and indicate low overlap for trait anxiety. These results indicate a large treatment effect for state anxiety (PND = 1.0, PAND = 1.0). For trait anxiety, there is debatably any effect present under the PND analysis and moderate effectiveness under the PAND analysis (PND = .50; PAND = .71). Therefore, the data indicate that hand holding was 100% effective in reducing the participants’ state anxiety and roughly 71% effective in reducing the participants’ overall trait anxiety (see Figure 6).
Figure 6. Participant two’s linear comparison for state and trait anxiety.

Adverse Events

As reported on the Post Session Questionnaire (Appendix F), the participant did note adverse events. The purpose of mentioning the adverse events is to account for extraneous variables, which may impact or skew the data and the effectiveness of the intervention. First, the participant noted that, during the first chemotherapy treatment (time point two), the oncologist came in to do an exam of the participant. This was unexpected by the participant and created concern and may have impacted the state anxiety score (30). However, this was to see if the participant was experiencing any complications with the treatment. During the same treatment, the participant had to leave for additional tests to be done, and recorded that she discovered a friend had also been diagnosed with cancer prior assessment administration. Second, despite
participant two mentioning that her car had broken down on the day of the third chemotherapy treatment (time point four), her anxiety scores were lower in state anxiety but displayed an increase in trait anxiety (state anxiety = 20; trait anxiety = 23). Lastly, on the first day of baseline measures where hand holding did not occur (state anxiety = 43; trait anxiety = 23), the participant noted that her car broken down again. Despite these situations occurring, the participant followed the protocol as intended within the study.

**Follow-up Interview**

The researcher asked participant two if she would be willing to provide any comments about her experience throughout the study; her responses indicate that holding hands during treatment was very helpful for both her and her husband. Specifically, the participant stated: “Having my husband there to hold my hand brought me comfort, and I even convinced other patients to start doing the same.” Participant two even mentioned that the effects of hand holding with her secure attachment had a calming effect for the secure attachment during treatment. The participant was asked to explain the increase in state anxiety experienced in the baseline measures immediately following the removal of hand holding. The participant stated: “Despite having good results [no evidence of disease], the treatment was difficult to sit through…I didn’t feel as calm as when we held hands….I felt safe with him there in the room and all, but it’s just comforting to hold his hand during these treatments.” As the participant was given further treatments by her oncologists for management, the researcher encouraged the participant to continue to use hand holding to help her anxiety during treatment.

**Participant Three**

Participant three is a 71-year-old male who was diagnosed with B-cell follicular non-Hodgkin’s lymphoma. Participant two completed an A-B single-case design where the
intervention of hand holding with a secure attachment was absent for time points one through four, but the secure attachment was present in the treatment room recording results for three consecutive weeks and off for one before repeating. For time points five through seven, measures were taken with the intervention of hand holding with a secure attachment. The raw data of state anxiety are as follows: 55, 52, 53, 51, 38, 30, and 28 (M = 43.85; SD = 11.56). The raw data of trait anxiety are as follows: 50, 49, 50, 51, 43, 35, and 33 (M = 44.42; SD = 7.61).

**State and Trait Anxiety Trend Comparison**

Participant three displayed a steady flat trend across all trait anxiety time points in phase A and a decreasing trend in phase B. The intervention phase (B) is noted as the B-Phase, and the baseline phase (A) is labeled as A-Phase within the graph (see Figure 7). Time point one was measured in a typical doctor-patient meeting room where the participant received the results of the CT scan. Time points two through seven were taken within the chemotherapy room at the Mid-South oncology setting. Looking at trait and state anxiety, time points one through three parallel (Trait – 50, 49, 50; State – 55, 52, 53) each other before measuring the same at time point four (Trait – 51; State – 51). The first four time points were taken without the use of the intervention of hand holding with a secure attachment. Within the intervention phase (B-Phase), the state and trait anxiety both began to decrease. The higher scores of trait anxiety may indicate that the participant experiences anxiety as a norm, related to the diagnosis of PTSD. During treatment, the participant’s scores indicate that the intervention improved state anxiety, despite the neutral trend in trait anxiety (see Figure 7).
Participant three’s trend comparison for state and trait anxiety.

**State Anxiety Cutoff Score**

The researcher used the cutoff score of 39 to determine clinical significance for participant three’s state anxiety (Julian, 2011). The raw data for the baseline phase (A) are as follows: 55, 52, 53, 51; scores for the intervention phase (B) are as follows: 38, 30, and 28 (see Figure 8). Results based on the state anxiety cutoff score of 39 indicate clinical significance for A-Phase but not B-Phase. Noticeably, participant three’s state anxiety was relatively stable in Phase A, though declining in Phase B. For this individual, the presence of a secure attachment did provide comfort in alleviating anxiety, but not to the same extent as when holding hands with the secure attachment (see Figure 8).
Visual and Statistical Analysis

As this participant completed measures under an A-B single-case design, significance is based on the results of the B-phase trend. For state anxiety, level analysis revealed a mean decrease from the baseline phase to the intervention phase (A-Phase M = 52.75; B-Phase M = 32). Level analysis for trait anxiety revealed a mean decrease across phases (A-Phase M = 50; B-Phase M = 37). State anxiety revealed a minimal variable decelerating-improving trend in baseline measures; after the introduction of the intervention, the trend continued in a decelerating-improving path. Trait anxiety displayed limited variability with an accelerating-deteriorating trend in baseline measures where, upon introduction of the intervention, there was a decelerating-improving trend. Analysis of variability revealed moderate variability for state anxiety (M = 43.85; Range = 28 – 55; SD = 11.56) and moderate variability for trait anxiety (M =
44.42, Range = 33 – 51, SD = 7.61) across both phases. Compared to the last data point in the baseline phase of state anxiety (state anxiety = 51), data noticeably decreased, starting with the first data point in the intervention phase (state anxiety = 38); this indicates an immediate treatment effect. Trait anxiety displayed a significant immediate effect across phases (Phase A = 51; Phase B = 43), indicating immediate effect across phases. Through visual analysis, the researcher determined that there was no overlap of data for state anxiety and low overlap for trait anxiety. These results indicate a large treatment effect for state anxiety (PND = 1.0; PAND = 1.0) and similarly for trait anxiety (PND = 1.0; PAND = 1.0). Finally, the data reveals 100% effectiveness when utilizing hand holding as an intervention to reduce state and trait anxiety for participant three (see Figure 9).

Figure 9. Participant three’s linear comparison for state and trait anxiety.
Adverse Events

When reviewing the results from participant three’s Post Session Questionnaire (Appendix F), the researcher identified adverse events. During the first chemotherapy measure (time point two), the patient fell asleep during treatment; therefore, instead of the participant completing the STAI (Speilberger, et al., 1983; Appendix G) at the scheduled 30 minutes after the start of treatment, the secure attachment recorded the responses to the STAI (Speilberger, et al., 1983; Appendix G) 45 minutes after the start of treatment. Lastly, the researcher was walking the clinic floor towards the research offices and passed the participant randomly by the lobby. The participant explained that another relative was present for treatment three (time point four; state anxiety = 51; trait anxiety 51), but that this was not recorded on the Post Session Questionnaire (Appendix F). As the participant had not noted this family member’s presence in the treatment room, the researcher made a note to record the event. The remaining sessions were completed as indicated in the protocol.

Follow-up Interview

The researcher asked the participant if he would be willing to participate in an interview following the completion of the study about his overall experience throughout the study. Participant three stated: “I knew what was ahead of me, and I knew the results were good going into treatments, but it was nice to have my wife there and to hold her hand.” The researcher asked the participant how he felt when holding hands during treatment compared to his feelings in the absence of hand holding. The participant explained: “This was easy-going all around, but I did feel more relaxed when we held hands, but I also felt relaxed when we just sat together.” As noted previously, the participant was diagnosed in the past with PTSD; thus, the researcher inquired if this had any impact. Participant three stated: “Yeah my medication keeps me
mentally relaxed, but my body still feels tense sometimes.” The researcher asked if the participant felt more tense when hand holding was absent, and he stated: “Yes, so I would just sleep or distract myself during treatment…but when we held hands we talked more.”

**Consistency of Data Across Similar Phases**

The final variable for consideration in visual analysis is consistency of data patterns across similar phases (Ray, 2015). Ray (2015) explained that this step in visual analysis is the review of replication of phases. Thus, participants’ baseline and intervention phases are discussed to assist in replication of results and to support the credibility of findings (Ray, 2015).

Participant one was only measured under the intervention, and may therefore offer skewed data compared to participants two and three, who also underwent baseline measures. In comparison of the first four intervention measures of state and trait anxiety, participant one displayed more variability, and less of a declining trend than participants two and three. The CT scan meeting measures for participants one and two were completed under the intervention phase. Participant one displayed higher trait anxiety and lower state anxiety at time point six compared to participant two’s measure at time point one. Participant two displayed an increasing trend for trait anxiety and decreasing trend for state anxiety within the first four measures, while participant three’s last three measures displayed a decreasing trend for both trait and state anxiety. In assessing baseline measures, participant two, within the last three measures, and participant three, within the first four measures, displayed similar variability and trends in both state and trait anxiety. For a visual of all participants data compared between phases, see Figure 10.
Figure 10. Consistency of data between participants and phases.
CHAPTER V:
DISCUSSION

This chapter includes an interpretation of each participant’s results with regard to each research question, limitations to the study, its applicability, and methodological implication findings. The chapter concludes with a discussion of areas for future research, specific recommendations for counselor educators, and a brief summary. The purpose of this dissertation was to explore how the anxiety levels of non-Hodgkin’s lymphoma patients receiving chemotherapy are affected while holding hands with a secure attachment. This chapter includes discussion and future research opportunities to help answer the following research questions:

(R1): Does hand holding with a secure attachment decrease the state and trait anxiety of non-Hodgkin’s lymphoma patients during treatment, as measured by the STAI (Speilberger et al., 1983)?

(R2): Does hand holding with a secure attachment during treatment decrease the state anxiety of non-Hodgkin’s lymphoma patients more compared to only having the secure attachment present during treatment, as measured by the STAI (Speilberger et al., 1983)?

(R3): Does hand holding with a secure attachment during treatment decrease the state anxiety of non-Hodgkin’s lymphoma patients below the cutoff score of 39, as measured by the STAI (Speilberger et al., 1983)?

The results indicate the following when participants held hands with a secure attachment during treatment: (a) there may be a favorable trend comparison between state and trait anxiety, (b) all participants’ state anxiety measured at or below the cutoff score of 39, (c) visual analysis and statistical analysis indicates possible significant results, and (d) follow-up interviews may have revealed a lasting effect for participants.
Participant One

Participant one was measured under a B-design where hand holding with a secure attachment occurred in each of the six chemotherapy measures and during the CT scan meeting. The purpose of the B-design single-case study was to see the effects, if any, hand holding would have on a participant across treatment, and thus serve as an intervention comparison for remaining participants. As participant one did not receive a baseline measure, or the absence of hand holding with a secure attachment, research question two was excluded from this discussion. Regarding research questions one and three, participant one’s results may indicate that the intervention was immediately effective in reducing state anxiety. Despite the increased scores at time point three, there was a decreasing trend in both state and trait anxiety. Significantly, the participant’s state and trait anxiety remained parallel; with the exception of the CT scan meeting and time point seven. This may be attributed to the secure attachment presence and the effects of hand holding. Participant one selected his spouse, who may help the participant’s trait anxiety regulate, while hand holding may have helped lower the state anxiety. Across all measures, state anxiety remained below the cutoff score of 39, which reveals the absence of state anxiety clinical significance (Julian, 2011). The participant’s trait anxiety for time points one through five were gradually declining when holding hands, despite not having the future prognosis in the CT scan meeting. Participant one completed time points one through five without knowing the effects of his treatment and if the prognosis was favorable. Therefore, to see the state anxiety scores fall outside the parameters of clinical significance (Julian, 2011), this is worth mentioning the intervention of hand holding may have had an anxiety reduction effect. Time point seven is also important to consider as state anxiety continued to decline and trait anxiety stabilized. Across all measures, it appears that the use of hand holding with a secure attachment was beneficial for this
participant and supported within the follow-up interview. The participant may have maintenance treatments throughout life; if this is the case, he indicated during the follow-up interview that he plans to hold his wife’s hand during each treatment.

**Participant Two**

Participant two was studied under a B-A design across time points. The participant was purposely selected given that her CT scan meeting was scheduled to occur before the start of treatments. This was important as it enabled the researcher to record a more accurate understanding of treatment effects as the unknown prognosis of disease may have impacted participant one. The CT scan meeting and the first three treatments were measured while participant two held hands with a secure attachment. Following completion of the third treatment, the intervention was withdrawn, but the secure attachment remained in the treatment room with the participant to record results. According to the findings in this study, each research question was addressed accordingly. The time points measured with the intervention displayed a decrease in state anxiety, but a moderate increase in trait anxiety. Based on visual analysis, upon removal of the intervention, the researcher found that state anxiety greatly increased and then minimally declined across the remaining measures. Trait anxiety continued to increase across the last three measures. As there was an increasing overall trend for both state and trait anxiety, it appears that the intervention was effective. Participant two appeared to be relatively calm, evidenced by the trait anxiety measures, but may have experienced more anxiety as treatment continued despite the good results from the CT scan meeting. Therefore, the researcher concluded that, despite a good prognosis with treatment, the experience of chemotherapy has a negative impact on anxiety (Barre et al., 2015). The measures the researcher used to assess the intervention helped reduce clinical significance (Julian, 2011) for state anxiety, but exceeded the
cutoff score of 39 once the intervention was removed. During the follow-up interview, the participant mentioned that she would receive future preventative maintenance treatments going forward. Given the effects of hand holding with a secure attachment for this participant, the participant was encouraged to use hand holding to reduce state anxiety during treatment.

**Participant Three**

Given the results for participants one and two, the researcher measured participant three using an A-B design. The same condition as that of participant two—of completing the CT scan meeting before treatment—was present for participant three. Participant three was unique in the fact that he was diagnosed with PTSD. Myers, Vanmeenen, and Servatius (2012) found that individuals with PTSD have higher trait anxiety than those without PTSD symptoms. Thus, the researcher identified this participant as a valuable addition to the study as an expected stable and higher trait anxiety could provide a good baseline comparison. In evaluating research questions one and two, the participant’s trait anxiety revealed an increasing trend across all baseline measures, but a decreasing trend in the intervention phase. The participant’s state anxiety revealed a minimally decreasing trend in the baseline and a moderate decreasing trend in the intervention phase. As participant three has PTSD, the researcher expected the trait anxiety of the participant to remain higher than that of the previous participants (Myers et al., 2012). However, using the intervention of hand holding with a secure attachment did not yield the expected results. Thus, for this participant, hand holding may produce effects even on trait anxiety during treatment. Regarding the third research question, the data reveals that the baseline measures of state anxiety were above the cutoff score of 39 and measures in the intervention phase were all below the cutoff score of 39 (Julian, 2011). The researcher deemed scores below the cutoff of 39 clinically significant (Julian, 2011). Concluding the follow-up
interview, the researcher explained to the participant that given the immediate effect the intervention had on the participant, it appears the study was beneficial and the researcher recommended that the participant use hand holding for future, preventative treatments.

**Implications for Practice and Future Research**

In the context of extant research, the findings of this dissertation have significant implications with regard to the effects of cancer patients’ anxiety while holding hands with a secure attachment. Overall, the results indicate that hand holding is an effective intervention to reduce the anxiety of non-Hodgkin’s lymphoma patients during treatment. This study’s findings align well with those of previous research focused on the importance of secure attachment relationships and the effects of hand holding on anxiety reduction (Adler & Page, 2008; Ainsworth, 1973; Barre et al., 2015; Bowlby, 1969; Ergott, 2008; Johnson et al., 2013; Maresh et al., 2013; Moon & Cho, 2001; Oh & Park, 2004; Pirbudak & Tepe, 2017; Weeks et al., 1993). Further, as there is a growing need to address cancer patient anxiety during treatment (Barre et al., 2015; Oerlemans et al., 2014), and hand holding may be effective in reducing patient anxiety and assist in physical adaptation to cancer treatment (Parham, 2009).

As Armitage et al. (2017) estimated in 2016, roughly 72,580 cases of non-Hodgkin’s lymphoma would arise in the United States alone; these patients are likely to experience significant psychological effects throughout treatment. Many patients are curious about their diagnosed form of non-Hodgkin’s lymphoma and discover informative but frightening statistics, such as the fact that patients have a five-year survival rate of 70% and a ten-year survival rate of 60% (American Cancer Society, 2016b). Chemocare (2018) has summarized the anxiety any cancer patient generally experiences as including: uneasiness, nervousness, worries, and/or fear in relation to the diagnosis of cancer and treatment. In addition to the diagnosis and realization
of the disease, Oerlemans et al. (2014) revealed that 48.7% \((N = 300)\) of cancer patients experience anxiety throughout treatment. Research seeking to assist the psychological needs of lymphoma cancer patients, specific to anxiety and depression reduction during treatment, was exceeding 15 years. Thus, the results of this dissertation sought to update research in this area and emphasize the importance and impact of hand holding as an effective intervention to assist in patient anxiety reduction.

This dissertation built upon the intervention foundations, but under separate conditions, of studies by Ergott (2008), Johnson et al. (2013), Pirbudak and Tepe (2017), and Nicholls et al. (2014). Ergott (2008) and Pirbudak and Tepe (2017) focused on hand holding to reduce patient anxiety in different settings, but did not focus on the use of a secure attachment’s presence. With regard to the baseline and intervention phases, each participant selected an individual who could attend each measure and with whom they felt an emotional bond. All participants in the present study chose their spouse as the secure attachment. Results of these studies (Ergott, 2008; Johnson et al., 2013; Pirbudak & Tepe, 2017; Nicholls et al., 2014) and this dissertation appear similar in terms of patient anxiety reduction. Nicholls et al. (2014) found that general patients in the medical field (non-cancer specific) experienced positive effects to their wellbeing when a secure attachment is present during treatment. The results of this dissertation may indicate that a secure attachment being present during treatment produces an equitable impact on patients as the Nicholls et al. (2014) identified, but specific to a cancer setting. However, when compared to adding the intervention of hand holding, the presence of a secure attachment did not produce as significant an effect on patient anxiety. Specifically, this study showed that the addition of hand holding with a secure attachment effectively lowered anxiety on a greater scale. Johnson et al. (2013) combined the presence of a secure attachment with hand holding to measure brain
activation when triggered by a threat. Results produced a greater reduction of fear and anxiety when holding hands with a secure attachment than with a stranger (Johnson et al., 2013). While the dependent variable was different in the Johnson et al. (2013) study and this dissertation, both studies indicate positive effects in anxiety reduction when holding hands with a secure attachment during an anxiety-triggering event. Comparatively to the Johnson et al. (2013) study, this dissertation furthered the field of knowledge in the effectiveness of hand holding with a secure attachment within a different threatening environment.

Oncology care teams (OCT) and mental health professionals (MHP) could apply the results of this dissertation within their treatment care. Under the care of OCT’s and MHP’s, non-Hodgkin’s lymphoma patients can be more informed about anxiety reduction throughout treatment. Specifically, any OCT that comes into contact with non-Hodgkin’s lymphoma patients, and potentially other cancer patients with different disease types receiving treatment, can offer the intervention of hand holding with a secure attachment as a useful method to lower anxiety during treatment. Oncology care teams may choose to inform non-Hodgkin’s patients who demonstrate anxiety tendencies or have a previous diagnosis of anxiety of the positive effects of hand holding with a secure attachment during treatment. Oncology care teams should ensure that patients have ample space to hold hands with the secure attachment during treatment, and continually assess the effectiveness of the intervention across other cancerous disease treatments.

Mental health professionals who are counseling non-Hodgkin’s lymphoma patients can also review these results and suggest the intervention as a coping mechanism during treatment. Also, knowing that the presence of a secure attachment during treatment can offer moderate state anxiety reduction, while hand holding with a secure attachment during treatment can provide
more significant anxiety reduction, provides the patient with options in case hand holding is not a first choice. Some participants may not be open to holding hands and even holding hands during treatment. Given the various designs used, results indicate that hand holding can be effective if used at the beginning of treatment, towards the end of treatment, or throughout treatment. Therefore, if a patient consults a MHP at any point in time throughout treatment, the results of this study would be useful in educating the patient. Finally, MHP’s who utilize talk-therapy and other forms of processing can reflect on the secure bond created with the secure attachment during treatment. This could further enrich their secure attachment relationship and potentially continue to impact the effects of hand holding during treatment. Additionally, the MHP may help the patient process what the secure attachment experienced while holding hands with the patient, so that the patient may feel more comfort and less of a burden, if such feelings are present. Reflecting on the treatments with a MHP may also be beneficial for the patient to process to help identify when they might feel more anxiety.

The results of this study may lead to future investigations of extending awareness of non-Hodgkin’s lymphoma patients’ anxiety experienced outside the treatment setting, and thus, begin to have an effect on the trait anxiety of patients. Patients reading statistics about their diagnosis and prognosis, for example, may feel additional stress and anxiety related to quality of life outside the treatment setting (American Cancer Society, 2016b; Nayak et al., 2017). Therefore, building research on useful interventions for OCT’s and MHP’s may help in the overall systemic care of patients during treatment and in daily life living with cancer.

In addition to the suggestions for guided awareness OCT’s and MHP’s can provide, the results of the present study have a number of implications for future research. First, the sample size of the present study was small; future research should focus on other cancerous diseases that
offer a potential for a larger sample size such as lung or breast cancers. Second, it would be helpful in visual and statistical analysis to utilize a single-case design. Importantly, every cancerous disease is treated differently and patients receive a varying number of treatments. Thus, researcher control is of high importance. If allowable, the use of an ABAB design may offer valuable data to extend the effectiveness of hand holding during cancer treatment.

Ray (2015) explained that single-case designs are viable for researchers who wish to contribute valuable information on intervention effects. The use of the various single-case designs in this study assisted in revealing specific participant results while also providing generalizable results (Adler & Page, 2008; Kazdin, 2011; Ray, 2015). This study differs from a case study in that there is a focus on the manipulation of the independent variable, which leads to causal inference linking treatment effectiveness (Ray, 2015). By allowing the researcher to manipulate the independent variable for participant one’s design, specific conclusions were discovered, which allowed for continued manipulation for the remaining participants’ designs. Therefore, future research should continue to investigate cancer patients’ mental health throughout treatment, including other forms of effective interventions to aid in systemic patient comfort.

At the conclusion of each participant’s measures, an unstructured interview was conducted. The purpose of the interview was to help identify commonalities and differences between participants. Participants expressed the positive effects hand holding offered in reducing their anxiety. Future studies should design a structured interview focusing on the benefits of hand holding throughout the course of treatment. This can help identify specific commonalities and differences between participants.
Limitations

The limitations of this study primarily relate to the treatment regimen length designed by the participants’ oncologists based on their diagnosis, biological factors, and environmental factors. Each non-Hodgkin’s lymphoma participant in the present study underwent six chemotherapy measures. The modifier for the study is the chemotherapy. The participant’s diagnosis of non-Hodgkin’s lymphoma is a result of increased deregulation of cellular development. Although participant selection was based on the Participant Screening Form (Appendix D), variables related to a patient’s genetics are beyond the control of the researcher. Patients were not required to submit cardiovascular records or any other genetic related medical records. It is also beyond the researcher’s control if a patient receives a port for infusion or elects for intravenous (IV) therapy, as this is often based on patient preference. Thus, if a patient chooses an IV each chemotherapy session, the patient runs the risk of “burning out” or “blowing” a vein, which might impact the patient’s selection of hand to hold and the hand holding experience in general. Each participant utilized a port to receive treatment, and no variation occurred to the researchers knowledge. Future studies could limit participant selection to only those that have a port to avoid this complication.

Participants’ STAI (Speilberger et al., 1983) responses were recorded by the participants’ secure attachments. The goal of this recording approach was to help ensure honest responses, as cancer participants may have not felt well enough to take the time to respond accurately during treatment. Thus, the secure attachment was able to read the questions, multiple times if needed, to the cancer participant. Each STAI (Speilberger et al., 1983) is intended to represent the participant’s day-to-day anxiety levels. One might assume that looking forward to the completion of treatment may impact a participant’s anxiety levels; thus, the goal was to measure
during the treatment and focus on the treatment time itself. Therefore, the Post Session Questionnaire (Appendix F) was used to explain imprecisions that occurred. Participants and secure attachments became frustrated at times having to repeat questions or ask to repeat answers. Thus, in scoring the results, the researcher discovered *scribbles* over ratings to circle a different rating. Further, maturation could be attributed in the same assessment being delivered. Future studies may want to randomize who reads and completes the assessment across the study.

For the purposes of this study, the researcher used the Post Session Questionnaire (Appendix F) to explain possible variables to treatment and results. However, a limitation was present in that whether or not participants were receiving individual mental health services was not included within the Post Session Questionnaire (Appendix F). Realizing this viable information midway through data collection, the researcher reviewed each participant’s medical notes and did not find any evidence that mental health treatment was ongoing. The medical notes containing this information were under the same technology portal referred to in chapter three. This information would have been important to document in case a participant was implementing coping skills during treatment in addition to the intervention or during the baseline phase. Each patient being treated with chemotherapy may have been experiencing various, unaccounted-for side effects, and may have been responding differently to the drugs. Moreover, some of the drugs administered cause an anti-depressant effect, but these results vary depending on the patient. It was also beyond the researcher’s control if the patient became ill during treatment, needed to exit to use the bathroom, switch hands to hold during treatment, walk about, or any other situation that would cause the participant to exit their treatment room. However, every effort was made to maintain stability and consistency through recordings on the Post
Session Questionnaire (Appendix F). Future studies should create a questionnaire for each measure that accounts for these more explicitly to maintain research consistency.

**Single-Case Designs and Analysis**

A single-case study design with a withdrawal / reversal design, such as ABAB (Ray, 2015) for all participants would provide more evidence of treatment effects; however, given the limited treatments within the participants’ total treatment regimen for non-Hodgkin’s lymphoma, the researcher determined that designs of B, A-B, and B-A would offer a better comparison. While the researcher’s goal was to obtain more participants within each design, the target population of non-Hodgkin’s lymphoma patients offers a smaller pool of candidates compared to other cancer types. Thus, future studies should open enrollment to various cancer types receiving treatment.

Ray (2015) explained that, to enable an intervention to have a lasting effect, a study design should end with the intervention, rather than the control period. To end the study with a withdrawal of the intervention may impede lasting effects of the intervention (Ray, 2015), as shown in participant two’s results. In the event that the participants’ cancer returned, the effects of reduced anxiety could be beneficial for future treatment. While participant two was measured under a B-A design, the researcher discussed with the participant that hand holding should be used for the remainder of her potential preventative treatments. Unfortunately, the remainder of the treatments could not be measured to see if hand holding had an immediate effect again, as the timing and administration of the preventative treatments were inconsistent with those of the previous measures. Therefore, future studies should focus on completing treatments with the intervention active. Participant two was also taking medication for anxiety reduction (see methodology). This may account for her consistently lower trait anxiety scores and should be
considered as a variable in future studies. Lastly, the A-B single-case study design is considered more limited due to internal validity threats and lack of control for history without a reversal design such as an ABAB design (Ray, 2015). While the use of an ABAB design would have been desirable, the minimum required measures the ABAB design would require would be 12 (three per phase) treatments. Given this limitation, the researcher suggests that by searching for other cancer types, there may be more treatments required to combat the disease. Most patients with non-Hodgkin’s lymphoma only undergo six chemotherapy treatments. To meet the requirement of inferential statistics, normality of distribution and independence of observations must be obtained (Ray, 2015). The normal distribution in this case was negatively affected due to the minimal time points recorded and that measures were recorded on a weekly basis for participant three (Ray, 2015). Participants one and two were assessed daily and may account for differing variation of state and trait scores. Given participants different time frame of a measurement once a week, this may also account for the given trends for state and trait. Given this limitation, the researcher decided to include both the both the PND and PAND as forms of statistical analysis.

As mentioned previously, there is a lack of clear evidence as to which statistical analysis is best for single-case study designs (Shadish et al., 2008; Smith, 2012). Thus, the researcher chose visual analysis to display significant results, determine a cutoff score for state anxiety, and measure the effect size using both PND and PAND (note: PND and PAND were only used for participants two and three as participant one did not have a baseline). While the researcher considered other methods of analysis, many had stipulations this study could not meet due to the limited amount of treatments given to participants.
Intervention

There are also a few limitations to consider when the participant is holding hands with the secure attachment. First, at times there was limited space for the secure attachment to sit at one of the oncology sites. This made it uncomfortable for the secure attachment to stretch across to hold hands. This was only an issue for participant three, which was noted in the Post Session Questionnaire (Appendix F). Thus, future studies may inquire about participants receiving ample space or their own treatment room/area to complete the hand holding measures under the STAI (Speilberger et al., 1983). Finally, oncology staff at times required the participants’ arm to check vitals, which required the breaking of hand contact. This was an issue for participant one. While this was not ideal, participant health understandably takes precedent. This was also recorded in the Post Session Questionnaire (Appendix F) as necessary. Including a questionnaire that accounts for the aforementioned could help conclude if there was an impact on anxiety caused by extraneous variables.

Summary

Individuals undergoing treatment for non-Hodgkin’s lymphoma can experience emotional distress impacting their quality-of-life (Adler & Page, 2008, American Cancer Society, 2016b). The purpose of this dissertation was to focus on the mental and emotional effects experienced during treatment as limited research has been conducted. Specifically, this study aimed to reduce the anxiety experienced during treatment for non-Hodgkin’s lymphoma when holding hands with a secure attachment. Holding hands to reduce patient anxiety has been effective in other treatment settings (Ergott, 2008; Pirbudak & Tepe, 2017). Thus, introducing the intervention of hand holding was selected to address the aforementioned problem non-Hodgkin’s lymphoma patients experience.
Results from all participants revealed state anxiety scores at or below the cutoff score of 39. Using visual analysis, the researcher determined that participant one displayed a decreasing trend in state and trait anxiety when utilizing hand holding with a secure attachment. Participant two experienced a decreasing trend in state anxiety and a minimally increased trend in trait anxiety with the use of hand holding with a secure attachment. State anxiety greatly increased moving into the baseline measures, but gradually declined even within the baseline measures. Trait anxiety displayed a moderate increase in the absence of the intervention. Participant three’s state and trait anxiety decreased immediately following the introduction of the intervention. Given these findings, the use of hand holding with a secure attachment during treatment for non-Hodgkin’s lymphoma patients might be an effective immediate intervention to decrease state anxiety and gradually decrease trait anxiety. Future research is warranted across different cancer disease types. This study can therefore function as a pilot study for future single-case designs, and eventually larger experimental designs.

Given the variability in each participant’s treatment of non-Hodgkin’s lymphoma, the use of a single-case design proved useful in recording specific and meaningful information. Moreover, the benefit of single-case designs is using a small sample size, which allows each participant to function as their own control (Ray, 2015). Future research should focus on using one single-case design, and specifically finding cancer patients whose treatment regimen exceeds six sessions in order to record more data.
REFERENCES


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APPENDICES

APPENDIX A:
University of Arkansas IRB Approval Letter

To: West R. Loveland
From: Douglas James Adams, Chair
IRB Committee
Date: 02/27/2019
Action: Expedited Approval
Action Date: 02/18/2019
Protocol #: 1808138113A002
Study Title: The Effects of Hand Holding on Cancer Patients' Level of Anxiety: A Single-Case Study
Expiration Date: 09/11/2019
Last Approval Date: 02/18/2019

The above-referenced protocol has been approved following expedited review by the IRB Committee that oversees research with human subjects.

If the research involves collaboration with another institution then the research cannot commence until the Committee receives written notification of approval from the collaborating institution's IRB.

It is the Principal Investigator's responsibility to obtain review and continued approval before the expiration date.

Protocols are approved for a maximum period of one year. You may not continue any research activity beyond the expiration date without Committee approval. Please submit continuation requests early enough to allow sufficient time for review. Failure to receive approval for continuation before the expiration date will result in the automatic suspension of the approval of this protocol. Information collected following suspension is unapproved research and cannot be reported or published as research data. If you do not wish continued approval, please notify the Committee of the study closure.

Adverse Events: Any serious or unexpected adverse event must be reported to the IRB Committee within 48 hours. All other adverse events should be reported within 10 working days.

Amendments: If you wish to change any aspect of this study, such as the procedures, the consent forms, study personnel, or number of participants, please submit an amendment to the IRB. All changes must be approved by the IRB Committee before they can be initiated.

You must maintain a research file for at least 3 years after completion of the study. This file should include all correspondence with the IRB Committee, original signed consent forms, and study data.

cc: David D Christian, Investigator
## APPENDIX B
Highlands Oncology IRB Approval Letter

#### Washington Regional Medical Center Institutional Review Board
3215 North Hills Blvd.
Fayetteville, AR 72703

#### Protocol Action Request & Approval Form

<table>
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<tr>
<th>Principal Investigator</th>
<th>Study Site(s)</th>
<th>Laboratory Facility(ies)</th>
<th>Sub-Investigator(s)</th>
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<td>Patrick M. Travis, MD</td>
<td>Highlands Oncology Group: Fayetteville, Rogers</td>
<td>Highlands Oncology Group: Fayetteville, Rogers</td>
<td>West Loveland</td>
<td>The Effects of Hand Holding on Cancer Patients Level of Anxiety: A Single Case Study</td>
</tr>
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#### IRB Action Request

- [ ] Initial Protocol Review: Original Protocol Date:
- [ ] Initial Informed Consent Review: Date/Version:
- [ ] Initial Investigator's Brochures: Date/Version:
- [ ] Emergency Use of Investigational Drug, Device, Treatment, & Other: Specify:
- [ ] Project Review for Re-approval: Date/Version:
  - Protocol Amendment: Date/Version: Version 3.0 dated 1-25-19
  - Informed Consent Form Amendment: Date/Version: Version 3 dated 1-25-19
  - Investigator's Brochures Amendment: Date/Version:
  - Educational, Non-invasive Study Review: Date/Version:
  - Amendment of FDA Form 1572: Date/Version:
  - Advertisement, Web Info, Recruitment: Specify:
  - Education/Information Document(s): Specify:
- [ ] Protocol Closure Report: Date
- [ ] Safety Report: Date
- [ ] Other: Specify: new Sub-is added to the 1572 (see comment section)

#### SECTION BELOW TO BE COMPLETED BY THE WRMC IRB:

<table>
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<th>Approval Status: Approval granted on 2-10-2019 for all items above, for a period of months.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approval Status:</td>
<td>Conditional approval granted: Specify: Not Approved</td>
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The following IRB Members abstained from deliberation and vote for all of the above items:

Comments:

- [Signature] 2-10-19

IRB Form Version: Jan 2004

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APPENDIX C
Informed Consent

**Investigator:** West Loveland, M.S., LMFT, LPC
University of Arkansas
wrlovela@uark.edu

**Faculty Advisor:** David Christian, Ph.D., LPC
University of Arkansas
ddchrist@uark.edu

**Description:** The purpose of this study is to explore how the anxiety levels of patients receiving treatment for non-Hodgkin’s lymphoma are affected while holding hands with a secure attachment.

**Research Question:** How is a patient’s anxiety affected during treatment when holding hands?

**Measurement:** State Trait Anxiety Inventory (Spielberger et al., 1983).

**Future Plans:** This study also aims to create future research integrating hand holding with other forms of cancer.

**Number of subjects:** A maximum of 10 participants will be selected. There are four groups. You will be placed in a group randomly.

**Procedures:**

**Cancer patient.** Seeking up to 10 non-Hodgkin lymphoma participants. They each will select their own secure attachment. A secure attachment can be a loved one, family member, friend, etc. The primary investigator and/or a sub-investigator will inform the patient of the study, and offer the chance to participate. If the patient is interested they will consent to give the sub-investigator their contact information (e-mail and phone number). The sub-investigator will contact them via e-mail and/or phone to discuss the informed consent and Participant Screening Form. If the patient wants to be a part of the study, they will sign and date the informed consent in person before their first treatment.

**Enrollment:** The study only has open enrollment for two months, in order to ensure that participants begin the study within a close time frame. The researcher in this study also serves as a sub-investigator and Dr. Pat Travis as the primary Investigator.

**Secure attachment.** Once accepted into the study, the sub-investigator will contact the secure attachment provided by the patient on the Participant Screening Form by phone. The researcher will call to explain the informed consent and Participant Screening Form. If the secure attachment wants to be a part of the study, they will sign the informed consent and Participant Screening Form when they arrive with the cancer participant. The Secure Attachment Protocol Form is only for the secure attachment to review and sign. This will help ensure accurate recording of results. This will be signed along with the previous forms.

**Data Collection:**
- Upon acceptance into the study, each participant is required to sign the informed consent and complete the Participant Screening Form in person.
- The cancer patient (participant) will select a secure attachment.
- The secure attachment will complete the Secure Attachment Protocol Form to review and sign in person.
- Treatment will begin as scheduled by the oncologist.
• **Participant 1** will go through all treatments and the CT results meeting without holding hands.
  
  o Your secure attachment person will attend each treatment.
  o The secure attachment will read the STAI to you and record answers 30 minutes after the start of treatment.
    - The STAI will be given at treatment 1, 2, 3, 4, 5, and 6.
    - The STAI will be given after your CT scan meeting with your oncologist midway through treatment. That is after treatment 3 and before treatment 4.
  o After each STAI, participants will complete the Post Session Questionnaire. This will explain any influence on your anxiety.
  o All results will be collected.

• **Participant 2** will go through all treatments and the CT results meeting while holding hands.
  
  o Your secure attachment person will attend each treatment.
  o The secure attachment will read the STAI to you and record answers 30 minutes after the start of treatment.
    - The STAI will be given at treatment 1, 2, 3, 4, 5, and 6.
    - Hold hands with your secure attachment throughout every treatment.
    - The STAI will be given after your CT scan meeting with your oncologist midway through treatment. That is after treatment 3 and before treatment 4.
  o After each STAI, participants will complete the Post Session Questionnaire. This will explain any influence on your anxiety.
  o All results will be collected.

• **Participant 3** will go through the first 3 treatments and the CT results meeting holding hands. The last 3 treatments you will not hold hands during treatment.
  
  o Your secure attachment person will attend each treatment.
  o The secure attachment will read the STAI to you and record answers 30 minutes after the start of treatment.
    - The STAI will be given at treatment 1, 2, 3, 4, 5, and 6.
    - Hold hands with your secure attachment for treatments 1, 2, 3.
    - Do not hold hands with your secure attachment during treatments 4, 5, 6.
    - The STAI will be given after your CT scan meeting with your oncologist midway through treatment. That is after treatment 3 and before treatment 4.
  o After each STAI, participants will complete the Post Session Questionnaire. This will explain any influence on your anxiety.
  o All results will be collected.

• **Participant 4** will go through the first 3 treatments and the CT results meeting without holding hands. The last 3 treatments you will hold hands during treatment.
  
  o Your secure attachment person will attend each treatment.
  o The secure attachment will read the STAI to you and record answers 30 minutes after the start of treatment.
The STAI will be given at treatment 1, 2, 3, 4, 5, and 6.
- Do not hold hands with your secure attachment for treatments 1, 2, 3.
- Hold hands with your secure attachment for treatments 4, 5, 6.
- The STAI will be given after your CT scan meeting with your oncologist midway through treatment. That is after treatment 3 and before treatment 4.
- Do not hold hands with your secure attachment during the CT results meeting.
  - After each STAI, participants will complete the Post Session Questionnaire. This will explain any influence on your anxiety.
  - All results will be collected.

Participants must be 18 years or older and have Lymphoma (Non-Hodgkin’s Lymphoma).

**Risks and Benefits:** Potential risks include identifying negative relational patterns. Though this is unlikely. In the event participants develop negative feelings, a referral will be offered to a Licensed Mental Health Professional, and the participant may exit the study at any point. Benefits include strengthening your relationship with your secure attachment. You may also experience lower anxiety during treatment.

*Note to participant: There is no guarantee this will aid in the overall treatment regimen.*

**Compensation:** By participating in this study to completion, you will receive a $25 gift card.

**Voluntary Participation:** You are free to refuse to participate in the research or to stop participating at any point. There are no negative consequences in exiting the study early. To receive the gift card, the participant must complete the study from start to completion.

**Confidentiality:** All of your documents will be collected and stored in a secure location. You will be assigned a participant code. All identifying information will be kept confidential to the extent allowed by state and federal law, Highlands Oncology Group, and the University of Arkansas policy.

**Questions:** If you have any questions about the research, please feel free to contact me by email: wrlovela@uark.edu. If you have questions or concerns about your rights as a research participant, you may contact the University’s IRB Coordinator, Ro Windwalker, 109 MLKG Building, 479-575-2208, irb@uark.edu.

I have read and understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Participant’s signature: ____________________________ Date: ____________________

Investigator’s signature: ____________________________ Date: ____________________
APPENDIX D
Participant Screening Form

Participant ID#: ___________________________
Gender: ________________________________
Relationship Status:
   ___ Single
   ___ Dating
   ___ Married
   ___ Divorced
   ___ Widowed
   ___ Remarried

Ethnicity:
   ___ African American
   ___ American Indian or Native American
   ___ Asian or Pacific Islander
   ___ Caucasian, Non-Hispanic
   ___ Hispanic or Latino
   ___ Middle Eastern
   ___ Bi/Multiracial (list) _______________________
   ___ Other ________________________________

Cancer Type:      Non-Hodgkin’s

Stage of Diagnosis (Circle one):   1     2     3     4

Please circle “yes” or “no” in response to the questions below. Then, please respond to the next question. Once the Research Acceptance Form is collected, you will be contacted if appropriate for the study. Thank you for your consideration to be a part in this study.

Have you been through chemotherapy before for the treatment of non-Hodgkin’s lymphoma or another type of cancer/illness?

   YES       NO

Can the same caretaker, loved one, significant other, etc. be at each treatment administered for the purpose of this study?

   YES       NO

If NO, explain why one caretaker, loved one, significant other, etc. cannot be at each treatment.
Do you and the selected caretaker, loved one, significant other, etc. have a secure attachment? Secure attachment, as defined in this study, is the enduring emotional bond that a person feels with another that results in the ability to manage anxiety.

YES          NO

If NO, explain why caretaker, loved one, significant other, etc. *is not* a secure attachment.

Does holding hands with the secure attachment create anxiety for you?

YES          NO

If YES, explain why.

Signature:

Date:
Thank you for your participation in this research. Please read through the Secure Attachment Protocol Form. It is very important that you follow this form throughout the study to help ensure accuracy and reliability.

Requirements of Chosen Secure Attachment:

- To attend each chemotherapy treatment
- To complete the State-Trait Anxiety Inventory each appointment assigned
- To complete the Post Session Questionnaire each appointment assigned
- **For those in groups two, three, and four ONLY**
  - You will hold the hand of the cancer patient for the entirety of the chemotherapy session. Record any deviation or breaking hand holding in the Post Session Questionnaire
  - Hold hands with your non-writing (not dominate) hand

Please follow the designated group you are assigned.

**Participant one.** Group one went through all seven measures without holding hands. A detailed protocol is listed below that group members followed based on the informed consent.

1. Your secure attachment person will attend each treatment.

2. The secure attachment will read the STAI to you and record answers 30 minutes after the start of treatment.

3. The STAI will be given at treatment 1, 2, 3, 4, 5, and 6.

4. The STAI will be given after your CT scan meeting with your oncologist midway through treatment. That is after treatment 3 and before treatment 4.

5. After each STAI, participants will complete the Post Session Questionnaire. This will explain any influence on your anxiety.

6. All results will be collected.

**Participant two.** Group two went through all seven measures while holding hands. A detailed protocol is listed below that group members followed based on the informed consent.

1. Your secure attachment person will attend each treatment.
2. The secure attachment will read the STAI to you and record answers 30 minutes after the start of treatment.

3. The STAI will be given at treatment 1, 2, 3, 4, 5, and 6.

4. Hold hands with your secure attachment throughout every treatment.

5. The STAI will be given after your CT scan meeting with your oncologist prior to starting treatment.

6. Hold hands with your secure attachment during the meeting.

7. After each STAI, participants will complete the Post Session Questionnaire. This will explain any influence on your anxiety.

8. All results will be collected.

Participant three. Group three went through the first four measures holding hands. The last three measures, the participant did not hold hands. A detailed protocol is listed below that group members followed based on the informed consent.

1. Your secure attachment person will attend each treatment.

2. The secure attachment will read the STAI to you and record answers 30 minutes after the start of treatment.

3. The STAI will be given at treatment 1, 2, 3, 4, 5, and 6.

4. Hold hands with your secure attachment for treatments 1, 2, 3.

5. Do not hold hands with your secure attachment during treatments 4, 5, 6.

6. The STAI will be given after your CT scan meeting with your oncologist prior to starting treatment.

7. Hold hands with your secure attachment during the meeting.

8. After each STAI, participants will complete the Post Session Questionnaire. This will
explain any influence on your anxiety.

9. All results will be collected.

Participant four. Group four went through the first four measures without holding hands. The last three measures, the participant was instructed to hold hands. A detailed protocol is listed below that group members followed based on the informed consent.

1. Your secure attachment person will attend each treatment.
2. The secure attachment will read the STAI to you and record answers 30 minutes after the start of treatment.
3. The STAI will be given at treatment 1, 2, 3, 4, 5, and 6.
4. Do not hold hands with your secure attachment for treatments 1, 2, 3.
5. Hold hands with your secure attachment for treatments 4, 5, 6.
6. The STAI will be given after your CT scan meeting with your oncologist prior to starting treatment.
7. Do not hold hands with your secure attachment during the CT results meeting.
8. After each STAI, participants will complete the Post Session Questionnaire. This will explain any influence on your anxiety.
9. All results will be collected.
APPENDIX F
Post Session Questionnaire

Please complete this form following the State-Trait Anxiety Inventory. Return this form and the State-Trait Anxiety Inventory to your nurse or the front desk.

1. Please explain any life altering events that have occurred in the past three weeks (since your last treatment) that may impact your mood today.

2. Please describe how has your relationship with your secure attachment been since your last treatment. Are there any conflicts that have impacted your mood today?

3. At any point during treatment, did you break hand contact leading up to the State-trait Anxiety Inventory? If so, please explain why.

4. Please explain any deviation from the Secure Attachment Protocol Form.

5. Please explain how you feel holding hands during treatment.