2008-07-24

Psychological and Physical Adjustment to Breast Cancer over 12 Months Following a Cognitive Behavioral Stress Management Intervention: Identifying Distinct Trajectories of Change

Aisha Kazi
University of Miami, a.kazi@yahoo.com

UNIVERSITY OF MIAMI

PSYCHOLOGICAL AND PHYSICAL ADJUSTMENT TO BREAST CANCER OVER 12 MONTHS FOLLOWING A COGNITIVE BEHAVIORAL STRESS MANAGEMENT INTERVENTION: IDENTIFYING DISTINCT TRAJECTORIES OF CHANGE

By

Aisha Kazi

A DISSERTATION

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements
for the degree of Doctor of Philosophy

Coral Gables, Florida

August 2008

UNIVERSITY OF MIAMI

A dissertation submitted in partial fulfillment of
the requirements for the degree of
Doctor of Philosophy

PSYCHOLOGICAL AND PHYSICAL ADJUSTMENT TO BREAST CANCER OVER 12 MONTHS FOLLOWING A COGNITIVE BEHAVIORAL STRESS MANAGEMENT INTERVENTION: IDENTIFYING DISTINCT TRAJECTORIES OF CHANGE

Aisha Kazi

Approved:

Dr. Charles S. Carver Professor of Psychology	Dr. Terri A. Scandura Dean of Graduate School
Dr. Michael H. Antoni Professor of Psychology	Dr. Frank Penedo Associate Professor of Psychology
Dr. Maria Llabre Professor of Psychology	Dr. Suzanne Lechner Associate Professor of Psychiatry

KAZI, AISHA (Ph.D., Psychology)
(August 2008)

<u>Psychological and Physical Adjustment
to Breast Cancer over 12 Months Following
a Cognitive Behavioral Stress Management
Intervention: Identifying Distinct Trajectories
of Change.</u>

Abstract of a dissertation at the University of Miami.

Thesis supervised by Professor Charles S. Carver.
No. of pages in text (124)

Breast cancer is a devastating disease that affects thousands of women every year influencing their psychological and physical well-being for many years after being diagnosed. The goal of the current study was to determine if there are distinct trajectories of functioning among breast cancer patients in the domains of negative psychological adjustment, positive psychological adjustment, and physical adjustment. This was accomplished using growth mixture modeling. Another goal of this study was to determine whether demographic, medical, and psychosocial variables were able to distinguish among the trajectories. The study combined women from two samples spanning 10 years providing a sample size of 376 women diagnosed and treated for breast cancer. These women were recruited to participate in a 10-week cognitive behavioral stress management intervention and were either randomized to the 10-week experimental condition or a one-day control group. It was hypothesized that distinct trajectories would emerge for each of the domains and that psychosocial variables (i.e., social support, benefit finding, and emotional approach coping) would distinguish among the trajectories. This study was able to statistically identify multiple classes or trajectories of adjustment, consistent with findings

reported by Helgeson and colleagues (2004) and Donovan and colleagues (2007). It is difficult to say, however, whether these classes differ in clinically significant ways.

The present study also provides a cautionary note to researchers who intend to use growth mixture modeling to identify different trajectories of functioning and the limitations associated with this statistical technique. First, it is important to start this process with strong empirical or theoretical support for the possibility of different classes or trajectories. Without this foundation it becomes difficult to justify why a certain number of classes were chosen. Another limitation of this statistical approach is that there is not a standard method for determining the best number of classes. There are conflicting opinions among researchers in the field about the best fit index to use when the multiple fit indices do not converge. A serious issue related to this is the fact that classes are used for interpreting results and drawing conclusions and inferences. Therefore, clinicians using GMM must be careful when deciding on the number of classes and the clinical inferences drawn from these analyses. Further research needs to be conducted validating these statistical techniques.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION AND OVERVIEW

Breast cancer is a devastating disease that affects thousands of women each year. It is estimated that more than 240,000 women will be diagnosed with breast cancer this year alone (American Cancer Society (ACS), 2007). According to ACS (2007), breast cancer is the most common type of cancer among American women and the third leading cause of death, after heart disease and lung cancer, among women. Initially, most breast cancer research focused on overall survival and time to progression. With advancements in the medical field and improved survival, researchers have shifted their course of study and have placed an increasing emphasis on investigating the quality of life of breast cancer patients following diagnosis and treatment.

Women with breast cancer undergo a dramatic and swift entry into a new and sometimes stressful realm of dealing with cancer and its treatment. The psychological and physical adjustment to the disease and treatment can be very difficult and can last many years after adjuvant treatment has ended (Helgeson & Tomich, 2005; Epping-Jordan et al., 1999; Badr et al., 2006; Jacobsen et al., 1999). However, over the past few decades, the psychological and physical adjustment to a diagnosis of breast cancer has changed in conjunction with advancements in the medical field.

In the not too distant past, a woman's only medical option was to have her breast(s) removed in an attempt to eradicate the cancer, and even then her prognosis was poor. Although advances in breast cancer treatment have enhanced the survival rate and prognosis of patients, they have also created a prolonged period of medical intervention. The current treatment for breast cancer includes various combinations of surgery, radiation therapy, chemotherapy, and/or hormone therapy (Tripathy, Dollinger, Rosenbaum, Rugo, Benz, Goodson, et al., 2002; Love, 2000; Harris et al., 1992). Researchers have found that such extensive medical intervention improves survival outcomes, but also has significant physical and psychological consequences for the breast cancer patient (Early Breast Cancer Trialists' Collaborative Group 1992; Ganz et al., 1998).

The adjustment period for women diagnosed with breast cancer can be a tumultuous process lasting many years after diagnosis and treatment. Initially after a diagnosis patients may struggle with the shock of receiving the diagnosis and may be confronted with their own mortality. Other areas that influence adjustment and may lead to distress are the treatment decision-making process; losses related to sexuality and femininity; treatment side effects which can include disfigurement, pain, nausea, fatigue, alopecia, and cognitive impairment; and, after treatment, the fear of recurrence (Shapiro et al., 2001; Frost et al., 2000; Rowland & Holland, 1988; Love 2000; Meyerowitz 1980; and Cella et al., 1990).

Distress has been found to occur throughout the course of treatment for breast cancer and beyond. Research examining women's psychological adjustment indicates that peaks in distress have been reported immediately after diagnosis, during adjuvant therapy, at the conclusion of adjuvant therapy, 6 months to 1 year after mastectomy, after diagnosis of a recurrence, and when the disease is declared terminal (Simmons, 1984; Hilton, 1988; Ganz et al, 1996; Frost et al., 2000, Ganz et al., 2004).

Women vary in the degree of distress they experience after diagnosis and treatment for breast cancer as some women develop anxiety and depressive disorders while other women adjust well without experiencing intense distress. The literature suggests that more than half of the women diagnosed with breast cancer are able to handle it well psychologically (Shapiro et al., 2001; Baker, Marcellus, Zabora, Polland, Jodrey, 1997; Spiegel, 1996). The factors distinguishing the course and process of adjustment have been studied widely. One contributor to differential adjustment to breast cancer can be seen in the literature examining adjustment and disease phase; women's physical, psychological, and social well-being have been found to vary across disease phase as supported by Frost and colleagues (2000). Other contributors to differences in overall adjustment include characteristics of the patient, such as age and educational level; social relationships and interpersonal resources; cognitive appraisals; and coping strategies (Compass & Leucken, 2002).

Although many previous studies have examined adjustment across time, efforts to isolate differences in trajectory are relatively recent. Helgeson and colleagues (2004) initiated this line of work, using growth mixture modeling to examine whether distinct trajectories exist in a population of women with breast cancer. They identified distinct trajectories of psychological and physical adjustment to breast cancer over 4 years and grouped women according to their adjustment pattern. They identified four distinct trajectories of adjustment over time for both mental and physical functioning. Helgeson et al. (2004) found that the majority of women in their study showed slight and steady improvement in functioning with time. However, there were other subgroups of women who were identified as having marked improvement or drastic deteriorations over time (see Figure 1a and 1b).

Following the identification of distinct adjustment trajectories, Helgeson et al. (2004) then compared these groups to each other to further explore group differences. Their findings suggested that age was a significant predictor of the different trajectories of physical functioning with the poorest physical functioning overall and presence of deterioration over time found among the eldest women. Younger women were found to have the best physical functioning over the course of the study or to have moderate initial functioning and subsequent improvement Helgeson and colleagues (2004) also distinguished the various adjustment trajectories on the basis of the women's personal (i.e., self-image, optimism, and perceived control) and social resources (i.e., social support). They found that both personal and social resources distinguished the trajectories of psychological and physical functioning, but only personal resources was found to be an independent predictor of physical functioning. Finally, Helgeson et al. (2004) were only able to find a very small relationship between stage of disease and patterns of functioning over time. The researchers proposed that this was primarily due to the relative homogeneity of the sample with regard to prognosis; the sample consisted mainly of women with stage I and II disease without recurrence over the course of the study.

One limitation of the Helgeson et al. (2004) study was that they were unable to identify variables that distinguished between some trajectories that were quite different from each other. For mental functioning, they were unable to distinguish between two groups that started out at the same level of functioning, but one of which deteriorated over time whereas the other improved over time. Presumably some important variable, such as coping style, was not measured.

More recently, Donovan and colleagues (2007) examined whether there were subgroups of adjustment in women with breast cancer that had distinct trajectories or patterns of fatigue. Like Helgeson et al. (2004), Donovan and colleagues (2007) also utilized growth mixture modeling. They found two distinct subgroups of women, a low fatigue group and a high fatigue group. This study was also able to distinguish these groups of women based on medical, demographic, and cognitive-behavioral factors; women who were in the "high-fatigue" group were more likely to be married, have a lower income, have a higher body mass index, engage in catastrophizing about fatigue, and be lower in exercise participation.

Helgeson et al. (2004) and Donovan et al.'s (2007), longitudinal examinations of adjustment to breast cancer appear to provide a new and more comprehensive picture of adjustment to breast cancer. In addition to the need for longitudinal examination of adjustment to breast cancer, there are many specific aspects of adjustment that should be considered in any exploration of breast cancer patient's adjustment, including their negative psychological adjustment, positive psychological adjustment, and physical adjustment. What follows is a review of the extant literature examining the psychological and physical adjustment of women being treated for breast cancer and some of the variables that might influence the trajectory of that adjustment.

Psychological Distress and Stress Related to Breast Cancer

The adjustment period for women with breast cancer can last many years. The literature reveals numerous negative psychological consequences for patients including depression, anxiety, anger, fear, frustration, and suicidal ideation (Shapiro, Lopez, Schwartz, Bootzin, Figueredo, Braden, & Kurker, 2001). The emotional distress associated with breast cancer diagnosis and treatment can stem from many factors. Some have suggested that the primary factors associated with distress are the fear of death or dying and fear of recurrence (Spencer et al., 1999). Other concerns associated with distress in this population stem from changes in sexual function, decline in physical health and functioning, fertility, relationship issues, concerns with body image, pain and the effects of adjuvant therapies (Spencer et al., 1999; Moyer & Salovey, 1996; Ganz et al., 1996).

Receiving a diagnosis of breast cancer is a life-altering event that can bring with it a great amount of stress. Holland and Rowland (1989) documented that breast cancer patients commonly experience a normal stress response characterized by shock, numbness, and denial and often experience despair and hopelessness as well. One of the psychological reactions to breast cancer and its treatment is the development of posttraumatic stress disorder (PTSD). In 1994 the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994) the definition of a criterion A stressor for PTSD was expanded to include being diagnosed with a life threatening illness. There have been estimates suggesting that up to 35% of women with breast cancer will experience symptoms of posttraumatic stress disorder (PTSD), such as intrusive thoughts and avoidance, at some point during the course of treatment of the disease (Mundy, Blanchard, Cirenza, Gargiulo, Maloy, & Blanchard, 2000). Studies have yielded conflicting estimates of the number of breast cancer patients who actually meet full criteria for the diagnosis of PTSD, with numbers ranging from 3% to 27% (Green et al., 1998; Alter et al., 1996; Andrykowski et al., 1998; Cordova et al, 1995; Jacobsen et al., 1998; Mundy et al., 2000).

Higher levels of cancer-related traumatic stress, such as intrusive and avoidant thoughts, have been correlated with greater levels of overall distress (Baider & Kaplan De-Nour, 1997; Cordova et al., 1995). Golden-Kreutz and Andersen (2004) found that cancer-related stress, as measured by the Impact of Events Scale, was associated with depressive symptoms in breast cancer patients and they accounted for 53% of the variance in depressive symptoms. In a prospective study, Golden-Kreutz and colleagues (2005) found that cancer-related stress predicted both psychological and physical quality of life at 4 and 12 month follow-ups.

Positive Psychological Adjustment and Breast Cancer

More than 50 years ago, the World Health Organization (WHO, 1948) defined health as a "state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (cf. Ryff & Singer, 1998, pg 1). Ryff and Singer (1998) have expanded this original definition to include three main principles. The first principle negates the wide held belief that health is related to a medical state; they argue instead that positive health should be viewed as a philosophical matter that addresses the issue of the "good life." The second principle they discussed was how an all-inclusive assessment of positive human health must contain both mental and physical health components and how they interact. Third, they defined positive human health as "an issue of engagement in living, involving expression of a broad range of human potentialities: intellectual, social, emotional, and physical" (Ryff & Singer, 1998, pg 2).

It was once believed that breast cancer patients experienced only negative psychosocial effects after diagnosis. This was reflected in that studies looking at psychological adjustment mostly were limited to looking solely at negative psychosocial sequelae after a breast cancer diagnosis and treatment (Shapiro et al., 2001; Watson et al., 1991). This only provides a glimpse into the world of breast cancer patients. "In contrast to the view of cancer as a trauma with uniformly negative effects, evidence supports the view of cancer as a psychosocial transition that can potentially elicit growth as well as distress" (Cordova et al, 2001). Researchers are beginning to shed light on the positive aspect of patients' experiences and adjustment to disease (Andrykowski, Brady, & Hunt, 1993; Shapiro et al., 2001). The literature indicates that more than half of women diagnosed with breast cancer are psychologically stable and are able to handle the diagnosis and treatment well (Shapiro et al., 2001; Baker et al., 1997; Spiegel, 1996).

One important reason to study positive affect separately from negative affect is that variations in well-being may not be detected if only negative affect is examined. Researchers have found in samples of cancer patients that participants do not necessarily exhibit high levels of negative affect, but sometimes are low in positive affect (Voogt et al., 2005; Helgeson & Tomich, 2005). That is to say, positive and negative affect do not appear to be mutually-exclusive or simply relative standing on a single dimension. Therefore, distinguishing between positive and negative affect will enhance our understanding of the psychological adjustment of cancer patients.

The experience of positive changes after a diagnosis and treatment for breast cancer has been documented in the literature. This outcome, labeled benefit finding or posttraumatic growth, has received growing attention in the past 10 years. This idea has been defined as "an identification of benefit from adversity" (Tennen & Affleck, 2002) or an "experience of significant positive changes arising from the struggle with a major life crisis" (Calhoun, Cann, Tedeschi, & McMillan, 2000).

Benefit finding has been identified in multiple medical populations including HIV positive patients, cancer patients, and patients suffering from myocardial infarctions (Tedeschi & Calhoun, 2004). Individuals experiencing posttraumatic growth have reported outcomes such as enhanced intimate relationships, a greater sense of purpose, greater spirituality, and change in life priorities (Carver & Antoni, 2004; Andrykowski, Brady, & Hunt, 1993; Stanton et al., 2002; Tedeschi & Calhoun, 1996). Carver and Antoni (2004) found that initial benefit finding in a sample of breast cancer patients predicted lower distress and depression four to seven years later. These findings indicate that it is appropriate to consider benefit finding itself as a predictor of psychological and physical functioning

Physical Adjustment and Breast Cancer

Limitations in physical functioning can be an extremely distressing experience for women (Luoma et al., 2004). A breast cancer patient's physical functioning can be drastically impaired by side effects from surgery and adjuvant therapies; this can last for many years after surgery and adjuvant therapy (Ganz et al., 1996). These side effects include pain, fatigue, and impaired physical ability to perform functions of daily living (Magnusson et al., 1999).

The treatment for breast cancer, surgery and adjuvant therapies can have very severe side effects on cancer patients. A few of the side effects from surgery, whether it be mastectomy, segmental mastectomy, or axillary node dissection, are parasthesia (numbness, pins and needles sensation), pain, and skin sensitivity (Ganz et al., 1996). Another major problem for women post-surgery is limited functioning in the arm on the side of the surgery site, due to lymphedema. Lymphedema is a collection of fluid that causes swelling (edema) in the arms. This can occur in patients who have had a mastectomy or one or more lymph nodes removed during surgery. Medications such as tamoxifen, radiation therapy, and injury to the lymph nodes can also cause lymphedema (Love, 2000). If left untreated, lymphedema can lead to increased swelling and hardening of the tissue, resulting in decreased function and mobility in the affected limb. It can also lead to chronic infections and other illnesses.

After surgery, patients often undergo cycles of chemotherapy and/or radiation therapy. These adjuvant therapies cause great concern among breast cancer patients. The physical limitations and resulting emotional sequelae from adjuvant therapies have been well documented. Reports indicate that fatigue remains one of the most common and disabling symptoms experienced by cancer patients and may continue for months and years following treatment (Andrykowski, Curran & Lightner, 1998; Bower et al., 2006; Broeckel, Jacobsen, Horton, Balducci, & Lyman, 1998; Jacobsen et al., 1999). Ganz and colleagues (1998) found in a cross-sectional study that breast cancer patients receiving adjuvant therapy reported poorer physical functioning compared to those who did not receive any adjuvant therapy. In a prospective study comparing breast cancer patients to healthy controls, Jacobsen and colleagues (1999) found that the breast cancer patients experienced more fatigue than controls. They also found that these differences were evident prior to the start of chemotherapy and fatigue worsened among patients after treatment started.

In addition to fatigue, chemotherapy can have drastic and very toxic effects on a woman's body. Chemotherapy often leads to ovarian failure, which results in premature menopause. Subsequent decreases in estrogen can lead to vaginal atrophy and dyspareunia (Kaplan, 1992; Schover, 1994), making it painful to engage in sexual activities. In addition to its impact on ovarian functioning, chemotherapy has also been found to be disruptive to a woman's body image, mood, psychological symptoms, and overall sexual functioning (Theriault & Sellin, 1994; Hughes, 1993; Ganz et al., 1998). Radiation therapy is also a cause for concern among breast cancer patients. Patients often complain about constant fatigue, burns, and skin irritation from the treatment (Hann, Jacobsen, Martin, Azzarello, & Greenberg, 1998; Love, 2000).

Predictors of Adjustment in Breast Cancer

The extant literature has examined predictors primarily in the context of adjustment at a specific time point, either at the time of surgery or after treatment. This unfortunately provides limited knowledge concerning the influence of these variables on the different trajectories of adjustment across time. They do however provide a starting point to explore which factors may influence the different subpopulations of breast cancer patients. Therefore, it is desirable to examine these predictors in the context of a trajectory framework.

Psychosocial Interventions

Past research has played an important role in establishing predictors of poor psychological adjustment to breast cancer. It is just as important, if not more so, to determine how to actively improve patients' adjustment to breast cancer and to determine what characteristics of individuals would make them more likely to benefit from an intervention. Psychosocial interventions can play an important role in improving a patient's quality of life with studies showing significant psychological, health behavior and biological effects (Andersen et al., 2004; Andersen, 1992). Anderson (1992) and van der Pompe and colleagues (1996) reviewed the literature on the benefits that interventions have had on cancer populations and concluded that interventions have been effective in improving breast cancer patient's coping abilities, reducing emotional distress and feelings of isolation, and improving psychosexual functioning.

A number of studies have evaluated the effectiveness of several cancer-focused intervention programs with different types of cancer patients. These interventions are generally composed of various components and intervention techniques including an emotionally supportive component, information provision, behavioral and cognitive techniques to build effective coping strategies and relaxation training to lower arousal (Trijsburg et al., 1992; Anderson, 1992).

Coping

Research has shown that coping style can play a significant role in a woman's adjustment to a breast cancer diagnosis and its treatment. Lazarus and Folkman (1984) have defined coping as the cognitive and behavioral ways through which people attempt to deal with a situation they perceive as exceeding their resources. The way in which a woman copes with a breast cancer diagnosis and treatment can be extremely important in determining her quality of life during and after treatment. Women's coping has adapted over the past few decades, due to change and progress made by our society in thinking about breast cancer (Moyer & Salovey, 1996). Previously, breast cancer was considered a taboo subject associated with shame and it was often concealed from friends and family.

In western cultures women now are often encouraged to openly discuss their feelings and seek support from friends, family and other survivors (Swanson, 1992;

Moyer & Salovey, 1996). This openness allows breast cancer patients to receive considerable support and advice from other survivors as well as maximize communication with their physicians. Open communication can be especially helpful in dealing with the psychological and physical adjustment following a breast cancer diagnosis and treatment.

The idea of openly communicating about one's feelings may not be as highly valued in non-western cultures. In a study of minorities with breast cancer, Culver and colleagues (2002) found that African-American women and Hispanic women use more religious coping than non-Hispanic Whites. African-American women also had lower levels of "venting" whereas Hispanic women hat the highest levels of "venting". This study revealed few differences between the groups of women and had a relatively small sample of African-American women. Our understanding of ethnic minorities coping strategies and adjustment to breast cancer is still very limited.

Studies of coping have generally found that forms of coping directed at addressing the problem and engaging relate to lower distress and better emotional adjustment to breast cancer (Carver et al., 1993; Epping-Jordan et al., 1999; Moyer & Salovey, 1996; Leucken & Compass, 2002). There are some inconsistencies in the coping literature, as evidenced by Stanton and colleagues' (2002) study. Their study found that approach-oriented coping strategies did not produce consistent positive results among all their dependent variables. They conclude that coping is not always a stable process and there may be varying mechanisms or moderating variables through which coping works.

Evidence suggests that coping through emotional approach (i.e., coping through actively processing and expressing emotion) may enhance adjustment in cancer patients (Stanton, Danoff-Burg, Cameron, & Ellis, 1994; Stanton, Kirk, Cameron, & Danoff-Burg, 2000). Randomized controlled studies of psychological interventions, in which one component is the facilitation of emotional expression, provide evidence that these interventions can enhance psychological adjustment (Fawzy, Cousins, et al., 1990; Spiegel, Bloom, & Yalom, 1981). Evidence also suggests that emotion-focused coping, including expression of emotion, predicts longer survival in breast cancer patients (Reynolds, Hurley, Torres et al., 2000). Emotional approach coping seems to be a strong predictor of psychological as well as health outcomes. Perhaps emotional approach coping is one variable that can distinguish among the various trajectories that emerge for psychological and physical functioning.

Social Support

Social support has received strong support in the literature as a predictor of enhanced quality of life and adjustment to breast cancer, whereas inadequate support and/or the absence of support has been linked to increased levels of distress and a more rapid progression of the disease (Shapiro et al., 2001). Helgeson and colleagues (2004) found that social support differentiated women with breast cancer in the highest functioning group, and therefore with lower levels of distress, from individuals in the lowest functioning group, such that individuals in the highest functioning group reported greater perceptions of social support. However, perceived social support did not significantly distinguish between the 2 trajectories that started out at the same level of distress, one of which showing improved functioning and the other showing decreased functioning. Perceived social support also did not distinguish between the trajectories of physical functioning in this study. Although, Helgeson et al.'s (2004) study about the relationship between perceived social support and adjustment was inconclusive, the role social support on adjustment merits further examination. It was therefore included in the present study in hopes of clarifying its effect on overall psychological and physical functioning.

Medical and Demographic Variables

Over the years researchers have investigated the influence of many medical and demographic variables on the adjustment of breast cancer patients. The influence of these variables is important to ascertain in order to determine the patient population that needs to be targeted for a psychosocial intervention. However, there has been inconsistent support regarding the relationship of certain variables. For example, some studies have shown that age is not related to psychological distress or adjustment in breast cancer patients (Maunsell et al., 1992) and others have demonstrated an inverse relationship, such that younger women experience more distress than older women (Ganz et al., 1992; Cordova et al., 1995; Stanton & Snider, 1993; Williamson, 2000). The differences in findings are likely influenced by the cross-sectional vs. longitudinal design of the studies, the presence of moderator variables, and different measures of emotional distress (Epping-Jordan et al., 1999; Schnoll, Harlow, Stolbach, & Brandt, 1998). Helgeson and colleagues (2004) found that age was not a significant predictor of the mental functioning trajectories. However, age did significantly distinguish among trajectories of physical functioning, in which younger women had better physical functioning.

Other important variables to examine are medical variables such as stage of disease, type of adjuvant therapy, and type of surgery. Greater distress has been associated with greater disease severity in some studies (Shapiro et al., 2001; Frost et al., 2000; Maunsell, Brisson & Deschenes, 1992; Schag, Ganz, Polinsky, Fred, Hirji, & Peterson, 1993) whereas other studies have been unable to replicate this finding (Schnoll et al., 2004; Cordova et al., 1995). The type of surgery (mastectomy vs. lumpectomy) has also been found to influence psychological adjustment as well as physical adjustment in some studies (Yurek, Farrar, Andersen, 2000).

Current Study

The current study aims to expand the current body of literature on adjusting to breast cancer by examining the longitudinal course of women's adjustment to a breast cancer diagnosis, treatment, and recovery. A goal of the current study is to expand upon the work started by Helgeson et al. (2004) and Donovan et al. (2007) and explore additional predictors that may distinguish between different subpopulations of women adjusting to breast cancer. Therefore a trajectory framework guides this study. That is, this study represents an attempt to segregate the sample in terms of differing trajectories of well-being over time. Data from a longitudinal group of women were utilized to better understand the psychological, physical, and social well being in women with breast cancer after diagnosis and surgery, through treatment, and beyond. Such understanding of the course of adjustment in women with breast cancer can guide the creation and implementation of comprehensive treatment plans for women struggling with the psychological and physical ramifications of the disease.

The current study also adds to the literature by examining the positive psychological adjustment of breast cancer patients. Sparse attention has been given to women's positive psychological adjustment after a diagnosis of breast cancer. This is an important area to research in order to determine what influences individual's positive adjustment to a chronic illness and therefore helping other women who might have a more negative adjustment.

In order to understand women's negative psychological adjustment to this disease, three domains of psychological adjustment including an index of women's distress, women's cognitive intrusions related to their breast cancer, and women's behavioral and cognitive avoidance related to the diagnosis and treatment of their breast cancer were examined. Positive psychological functioning was also studied to determine the presence of distinct trajectories of adjustment. For physical functioning, patients' fatigue and the impact of fatigue on their quality of life were examined with the goal, again, of ascertaining whether or not distinct groups of patients had systematically different trajectories. Finally, a third goal of this study was to identify predictors of the emergent groups, based on psychosocial, medical and demographic variables that have been described in the literature as important to psychological and physical adjustment.

Hypotheses

1. The first goal of this study is to identify distinct trajectories or patterns of mental and physical functioning over 1 year following breast cancer surgery. Based on the article by Helgeson and colleagues (2004), I hypothesized that the population to be analyzed is not homogeneous in its adjustment, but consists of subgroups of individuals with different patterns

of growth, each subgroup defined by a distinct trajectory. In testing for the existence of different trajectories, I looked at the different facets of adjustment separately. Negative psychological adjustment, positive psychological adjustment and physical adjustment were analyzed as separate outcome variables.

2. The second goal of this study was to try to differentiate the groups that emerged on the basis of other variables. I believed women displaying these differing trajectories of adjustment can be differentiated on the basis of demographic variables, disease-related variables, and psychosocial variables, which were outlined in the previous pages. Variables that were examined in this respect are the following:
    a. Social support
    b. Benefit finding
    c. Emotional approach coping
    d. Demographic and medical variables
3. The third goal of this study was to examine the degree to which trajectory groupings differ between the different types of adjustment (negative, positive, and physical).

CHAPTER 2

STUDY METHODS

Participants

The current sample of women came from two separate NCI studies spanning 10 years. The studies were similar, in that they provided a CBSM intervention to recently diagnosed breast cancer patients. The recruitment period for the earlier of the two studies (sample 1) was from 1995 to 2000. The more recent study (sample 2) recruited women from 2000 to 2004. The main difference between the two studies is that the purpose of Study 1 was to determine whether a CBSM intervention had positive effects on women's psychological functioning. In addition to examining the effects on psychological functioning, Study 2 also examined if the CBSM intervention affected immune functioning in women with breast cancer. There are a few minor differences in methodology between the two studies that are addressed later.

The studies included women recently diagnosed with breast cancer currently living in Miami-Dade, Broward, Palm Beach and Monroe counties in South Florida. Participants were recruited from local hospitals and from local, private, oncology surgeons by mailing letters and fliers on behalf of each physician, inviting patients to call to determine further eligibility for participation. Research associates also mailed letters to potentially eligible participants based on listings provided by the South Florida chapter of the American Cancer Society. In addition, advertisements were utilized for recruitment describing the research study along with brief eligibility criteria to local media sources, including community newspapers, written press releases, and local radio stations.

Eligibility Criteria

Participants were adult women, aged 18 – 79 who had a recent diagnosis of Stage 0 – III breast cancer. Sample 1 consisted of women with stage 0-II breast cancer, whereas sample 2 also included women with Stage III breast cancer. The intervention was conducted in a group format and women were organized into cohorts based on surgery date. The rationale for establishing the groups based on surgery dates was to create a group in which participants were going through similar experiences and could relate to one another in a group setting. In order to be eligible for participation, all participants had to have had surgery for breast cancer within 10-weeks (± 1 week) of each other. Interested women who did not fit within the cohort window were provided with a referral list of other resources for women with breast cancer. Another criterion was that participants had to be willing to be randomized to either the 10-week intervention or 1-day control group and they had to be willing to participate in follow-up assessments for at least 12 months after study entry. Sample 2 extended the assessment period to 18 months after study entry.

Exclusion criteria

Women were excluded from this study during the initial phone screen if they were diagnosed with a previous cancer, major psychiatric illness or hospitalization for a psychiatric illness, concurrent serious medical illness, or lack of fluency in English.

Procedures

Interested women contacted the Coping and Recovery research office and took part in a 30-minute phone screen to determine eligibility. In exchange for completing psychosocial and immune assessments, women were compensated $50 if they completed the psychosocial portion of the assessment and $75 if they completed the immune portion of the assessment. Women who were interested in the study and met eligibility criteria provided verbal consent for randomization. Participants were informed of their eligibility status within one week after the phone screen. However, participants were not informed of their group assignment status until after they had completed their baseline assessment.

Psychosocial Assessment Procedures and Measures

Self-report and clinical interview assessments were conducted at 4 time points in sample 1 and 5 time points in sample 2: The first assessment (T1) was approximately 2 – 12 weeks after surgery (the recruitment window) and before they participated in either the intervention or the control group. The second assessment (T2) was 3-months from baseline (after the intervention); the third assessment was 6-months from baseline (T3) and the last assessment was 12 months from baseline (T4). The 5th assessment for women in sample 2 was conducted at 18 months from baseline.

Intervention participants started the 10-week group within a few weeks of the close of the recruitment window. In sample 1, control participants were invited to attend the one-day seminar after they completed their T2 assessment. In sample 2, control participants were invited to attend the one-day seminar after they had completed their T1 assessment.

Participants were mailed a questionnaire packet containing self-report measures, with detailed instructions for completion. Women were given the option of returning the questionnaire in a pre-addressed, stamped envelope or in person at the time of their scheduled clinical interview. Written informed consent was also sent along with the T1 questionnaire. After completion of their T1 questionnaire, women were informed of their group status as well as when the groups would start.

At each assessment time point an individual meeting was also scheduled for each participant. This meeting consisted of a few self-report measures and a 30-minute structured clinical interview conducted by a trained psychology graduate student. The Structured Interview Guide for the Hamilton Anxiety and Depression Scales (SIGH-AD; Williams, 1988) was used to assess symptoms of depression and anxiety occurring in the past week. Optimally, completion of the self-report questionnaire and the clinical interview occurred within 2 weeks of one another.

Some women also participated in an immune portion of the study during this session. These women had their blood drawn and a sample of saliva taken. As these measures are not a component of the current study, they are not described further.

CBSM Intervention

The intervention consisted of ten weekly group sessions lasting 2 ½ hours. Two female therapists led groups; either advanced doctoral students, post-doctoral fellows, or clinical psychologists acting as co therapists. Each group consisted of between 3 and 8 women. The intervention was manualized (Antoni, 2003) and included relaxation training and practice and didactic material. Each week a new relaxation technique was introduced to participants in order to present them with a variety of techniques so that they could find one or more that was effective for them. The types of relaxation introduced to participants included progressive muscle relaxation, guided imagery, and mindfulness and mantra meditation. The didactic component of the intervention included building awareness of the physiological, emotional, cognitive, behavioral, and social manifestations of stress, formal cognitive restructuring, emotion-focused and problem-focused coping, utilization of social support networks, anger management, and assertiveness training. Participants were assigned weekly homework, which included practicing the relaxation techniques on a daily basis and applied exercises that were relevant to that week's didactic instruction.

Control Group

The control condition consisted of a one-day seminar (lasting 5-6 hrs) that covered a condensed version of the information provided in the full 10-week intervention. Approximately 3 relaxation techniques were demonstrated in this group. Group members were encouraged to participate; however, social interaction was limited due to time constraints. In sample 1, participants were invited to the one-day seminar after the T2 assessment was completed, which coincided with the completion of the 10-week group. In sample 2, participants were invited to the one-day seminar within 10 weeks of study entry. If they were unable to attend this seminar due to scheduling conflicts they were invited to attend other seminars.

Measures for Outcome Variables

Negative adjustment. Several self-report questionnaires were used to assess facets of negative psychological adjustment over time. The Impact of Events Scale (IES) was used to assess two kinds of symptoms of anxiety and distress. The IES (Horowitz, Wilner, & Alvarez, 1979) is a 15-item measure that assesses a person's cognitive patterns surrounding specific life experiences, in this case, the diagnosis of breast cancer. Respondents rated the extent to which they are experiencing various cognitive symptoms using a Likert-type scale, where 1 = not at all, 2 = rarely, 3 = sometimes, and 4 = often.

The IES has 2 subscales: intrusion and avoidance. The intrusion scale measures how much a participant is currently experiencing distressing thoughts or images related to their breast cancer diagnosis or treatment (e.g., "I had a dream about it."). On the other hand, the avoidance scale measures how much participants are trying to avoid or prevent themselves from having thoughts related to their diagnosis and treatment for breast cancer (e.g., "I tried to remove it from my memory."). Traditionally, researchers have used the IES scores to measure the impact that stressful life events have on a person's life. Higher scores indicate that the stressful life event is having a greater impact on the person's life.

Another index of distress was created for this study. Emotional distress was measured in both sample 1 and sample 2; however, the measures varied. In sample 1, the Affects Balance Scale (ABS) was used (Derogatis, 1975). The ABS consists of a list of adjectives that are used to describe a variety of moods, both positive and negative, that have been experienced during the 7-days preceding its completion. Respondents rate the extent to which they have experienced a "feeling" ranging from 1 (never) to 5 (always). Sample 2 utilized the Profile of Mood States (POMS) (McNair, Lorr, & Droppelman, 1971). Participants indicated the extent to which they had the feeling described in each item on a scale from *not at all* (1) to *extremely* (5). These measures share eight items that reflect distress. A distress index was created which included items that assess anxiety ("tense", "nervous", "anxious"), anger ("angry", "resentful"), and depression ("unhappy", "worthless", "hopeless"). There were strong correlations in each sample among the affective descriptors (ranging from .57 to .67) therefore the eight items were averaged.

Alphas were .82 in sample 1 and .85 in sample 2. This method has been previously used in other studies (Carver et al., 2005).

Positive adjustment. Positive psychological adjustment was measured by combining affective descriptors from the same two self-report measures (ABS and POMS), in a manner similar to that used to create the distress index. These measures share five items that reflect a state of positive engagement. An index of positive engagement was created including the following descriptors: friendly, lively, cheerful, active, and energetic. There were strong correlations in each study among the affective descriptors (ranging from .45 to .69) therefore the five items were averaged. Alphas were .83 in sample 1 and .85 in sample 2.

Physical adjustment. Unfortunately, measures of physical adjustment were not utilized in both samples; therefore, physical adjustment was examined only in sample 2. Several self-report measures were used to assess physical adjustment over time. The Fatigue Symptom Inventory (FSI) assesses the frequency and severity of fatigue as well as its perceived interference with quality of life. Frequency was measured as the number of days in the past week (0-7) respondents felt fatigued as well as the percentage of each day on average they felt fatigued (1 = none of the day, 7 = entire day). Severity was measured on a 9-point scale (1 = not at all fatigued, 9 = as fatigued as I could be) that assesses average fatigue during the past week. Perceived interference was measured on seven separate 9-point scales (1= no interference, 9 = extreme interference) that assessed the degree to which fatigue was judged to interfere with general activity, ability to bathe and dress, normal work activity, ability to concentrate, relations with others, enjoyment of life, and mood in the past week.

Physical adjustment over time was also assessed by two scales from the Functional Assessment of Cancer Therapy-Breast (FACT-B). The FACT-B is a widely used 36-item, self-report measure designed for use with breast cancer patients to assess multi-dimensional QOL (Brady et al., 1997). The subscales used were physical well-being and functional well-being. The FACT-B is coded so that higher scores reflect better quality of life.

Measures for Predictor Variables

Benefit finding. Benefit finding was assessed by a stem that began with "Having had breast cancer …." Each of the items expressed a potential benefit that might be derived from the cancer experience (see Tomich & Helgeson, 2004). The list of items include benefits ranging from family and social relationships, life priorities, sense of spirituality, career goals, self control, and ability to accept circumstances. Response options used were "Not at all" (1), "A little" (2), "Moderately" (3), "Quite a bit" (4), and "Extremely" (5). This was a 17-item measure that was taken from a more extensive measure assessing benefit finding. The measure was reduced because of redundancy and confusing items.

Emotional approach coping. The Emotional Approach Coping scale was developed to assess the occurrence of emotional processing (Stanton, Kirk, Cameron, & Danoff-Burg, 2000). Two sets of six items each were included, one on examination of emotions (e.g., "I've been taking time to figure out what I'm really feeling," "I've been exploring my emotions"), the other on expression of emotions (e.g., "I've been expressing the feelings I am having," "I've been taking time to express my emotions"). Responses were made on a scale with the labels "I haven't been doing this at all" (1), “I’ve been doing this a little bit” (2), “I’ve been doing this a medium amount (3), and “I’ve been doing this a lot” (4).

Social support. The Functional Assessment of Cancer Therapy-Breast (FACT-B) is a widely used 36-item, self-report measure designed for use with breast cancer patients to assess multi-dimensional QOL (Brady et al., 1997). The subscale on social and family well-being was used as an index of satisfaction with social support. This subscale has 5 questions related to social support provided by friends and family (“I get emotional support from my family” and “I get support from my friends”).

CHAPTER 3

RESULTS

Definition of the Sample and Demographic Variables

The sample for this study consisted of 376 women being treated for Stage 0-III breast cancer. This sample was combined from 2 studies in an NCI project spanning 10 years of women's recruitment into CBSM intervention trials for breast cancer patients. Participants were diagnosed with Stage 0 (n = 54), Stage 1 (n = 155), Stage 2 (n = 148), or Stage 3 (n = 19) breast cancer. All women were treated with surgery: lumpectomy (n = 185) or mastectomy (n = 191). The majority of women were married or in a marriage-like relationship (66%). Ages ranged from 23 to 79, with a mean of 50.3 (SD = 9.06). Participants were mostly Caucasian (70%), African American (8%), and Hispanic (22%). This was a highly educated sample, with a mean education of 15.58 years (SD = 3.44). Participants were randomized to either the intervention group (n = 178) or the control group (n = 197).

Table 1 contains demographic descriptions by sample (sample 1 vs. sample 2). Table 2 contains descriptions of treatment-related and medical variables by sample. Between-group analyses of all of these variables revealed significant differences between the 2 groups on marital status, chemotherapy receipt, radiation therapy, and tamoxifen therapy. In the first sample, 73% of sample were partnered and in the second sample only 63% of the sample were partnered (χ^2 (1, 136) = 4.11, p = .041). The two groups also differed with respect to adjuvant therapy receipt. In the first sample only 42% of participants received chemotherapy, whereas in the second sample, 57% of participants were given chemotherapy (χ^2 (1, 136) = 8.00, p = .01). Similarly, in the first sample, 43%

of participants received radiation therapy, whereas in the second sample, 61% of participants received radiation therapy (χ^2 (1,136) = 12.12, $p < .001$). Also, 48% of participants in the first sample received tamoxifen, whereas in the second sample, 70% of participants received tamoxifen. This is likely due to the change in standard of medical care over a 10-year span.

Missing Data

The models were estimated with the software package Mplus 3.0 (Muthén & Muthén, 2001). Missing values are estimated with full information maximum likelihood (FIML) estimation using all observations in the data set. This software allows missing data in all parts of the growth mixture model with the exception of the predictors. Mplus will provide valid results in the presence of missing data if the missing data falls into the classification of MAR (missing at random) or MCAR (missing completely at random). Data that are missing at random (MAR) may be predicted from another variable in the model, but not from the missing variable itself (Schafer & Graham, 2002).

Statistical Analyses

The data were analyzed with a combination of latent growth modeling (LGM) and growth mixture modeling (GMM). The LGM was used to determine overall model fit for the outcome variables and to examine the relationship between key demographic, medical, and psychosocial variables with the outcome variable. The GMM was used to test for the existence of clusters that could be separated.

There are a few key differences between LGM and GMM. LGM estimates the mean growth in the sample population, how much individuals vary across the intercepts and slopes, and how covariates affect this variation (Muthén, 2004). LGM is based on the assumption that all participants are derived from the same population with similar population parameters. Growth mixture modeling is not based on a single-population assumption and therefore has more flexibility by allowing for parameter differences. Categorical latent variables are introduced into the model allowing for the identification of latent class trajectories. Therefore, "the growth mixture model allows different classes of individuals to vary around different mean growth curves" (Muthén, 2004, p. 348).

Prior to analyzing the data using growth mixture modeling, a general latent growth-curve model was estimated to determine overall model fit for the outcome variables. There are several indices of model fit that are used when identifying the best LGM for the data. The main fit index is the chi-square statistic which tests the null hypothesis. A nonsignificant chi-square is indicative of good model fit. Three other measures of model fit that are reported by Mplus and are used in deciding on the best model. These are the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR). For the CFI, values of .95 indicate good fit. For RMSEA, values below .05 indicate good fit. Lastly, for the SRMR, values below .10 indicate good fit (Kline, 2005). For all outcome variables, linear and quadratic effects were tested. In general, quadratic effects proved not to be significant and accordingly were not retained in the final model. Any exceptions to this are noted below.

Figure 2 illustrates a growth mixture model. This model is based on a conventional continuous LGM which consists of multiple indicators (Y) of the intercept and slope. Y is measured at four time points: baseline (0), three months (3), six months (6), and twelve months (12). The latent categorical variable (C) is introduced to this model and it signifies the latent trajectory classes. The fixed parameters for this model consist of the mean slope and intercept for the sample. The variance and covariances of the intercept and slope are estimated due to the fact that individuals are allowed to deviate from the group average (Muthén, 2004).

The fit indices for GMM included Akikae Information Criterion (AIC), Bayesian Information Criterion (BIC), sample size adjusted BIC, Entropy, and the Lo, Mendell, and Rubin likelihood ratio test (Muthén, 2003; Nylund, Asparouhov, & Muthén, 2006). For AIC, BIC, and adjusted BIC, smaller numbers are indicative of a better class. Entropy is a measure of how clearly distinguishable the classes are based on how distinctively each individual's class probability is. It ranges from zero to one with values close to one indicating clear classification (Acock, 2005). The Lo, Mendell, and Rubin likelihood ratio test uses a special distribution for estimating the probability. This test provides a p-value that is used to establish if there is improvement in fit between class models (Lo, Mendell, Rubin, 2001; Nylund, Asparouhov, & Muthén, 2006).

Thus far, researchers have disagreed about the best criteria for determining the number of classes in mixture modeling. When fit indices converge, the decision of what is an appropriated number of latent classes is straightforward; however, when the fit indices do not converge, the decision becomes more complicated. In a study by Yang (2006) it was found that sample size adjusted BIC was a better indicator of fit in a simulation study for latent class analyses, compared to AIC and BIC (cf. Nylund, Asparouhov, & Muthén, 2006). Therefore, sample size adjusted BIC was the primary index used here when the other fit indices provided conflicting information.

Due to *a priori* knowledge of intervention effects on some of the outcome variables used in this study, the sample was tested to determine if intervention status significantly predicted the overall trajectory of the outcomes in the LGMs. If intervention effects were observed on the outcome variables, further analyses using growth mixture modeling analyzed the experimental conditions separately. The rationale for this is to be able to attribute any differences that may arise in trajectories to the variables of interest, rather than to the intervention. Analyzing a combined sample of intervention participants and control participants could confound the results if an intervention effect exists.

Demographic, medical, and key psychosocial predictor variables of interest were also examined to determine their relationship to the outcome variables. These variables were specified in the LGM to determine if they were significantly related to the outcome variable. The purpose of this step is to identify which variables significantly affect the intercept and slopes of the outcome variables and should then be included in the GMM analyses. This is an important step to include prior to conducting the GMM analyses. The reason these variables are examined at this step is that if variables are significantly related to either the intercept or the slope of the outcome variable and they are not included when trying to identify trajectory groupings, the slope of the trajectories will be altered, as will the class membership for each trajectory. According to Muthén (2003, p. 355), "covariates should be allowed to influence not only class membership but also the growth factors directly…" Muthén (2003) also indicates that an imprecise model may be result if the covariates are excluded because of their direct influence on the growth factors. Therefore, variables that were significantly related to the outcome variables, in either the intercept or slope in the LGM analyses, were retained in the growth mixture modeling analyses when trying to identify distinct trajectories.

The first part of the Growth Mixture Modeling (GMM) analyses was aimed at identifying distinct trajectories of negative psychological functioning, positive psychological functioning, and physical functioning. Each outcome was looked at independently. For each outcome variable, the optimal number of trajectories that represent distinct patterns of change had to be determined. A categorical latent variable was introduced to the conventional latent growth curve model to identify the number of latent trajectory classes. Multiple models were specified, identifying 1 through 5 latent classes, and then compared based on multiple fit indices. Once the number of classes was identified for each outcome variable, based on the fit indices, covariate variables were included in the model to identify significant predictors of the latent classes. The structure of this model is shown in Figure 3.

Another question that arose while analyzing the data was if there is improvement in the fit indices in the GMM compared to the LGM. In other words, is there significant evidence that multiple latent classes are warranted? There is not a specific test that provides the answer to this question. However, I compared the BIC obtained from the GMM to the BIC obtained from the LGM analyses. If the BIC from the GMM was smaller (indicating better fit) than that from the LGM, then it provided at least some evidence that it was acceptable to run the GMM analyses to determine how many latent classes fit the data. This observational test was conducted retrospectively after all analyses were concluded. For each outcome variable analyzed in this study, the BIC from the GMM was indeed smaller than the BIC obtained for the LGM.

Negative Psychological Adjustment

Distress

In the analysis of distress, the initial LGM model specified a trajectory of 0, 3, 6, and 12 months. This model did not fit the data; therefore, time 4 was allowed to be freely estimated. This model fit was very good: χ^2 (4) = 3.11, p = .54, CFI = 1.00, RMSEA = .00, and SRMR = .04. The value estimated for time 4 was 5.29 months, indicating no change from time 3 to time 4.

To determine whether there was a significant difference in the overall trajectory of distress between participants in the first sample vs. the second sample, a variable distinguishing the two samples was added to the LGM model. This model fit the data: □^{2} (6) 3.58, p = .73, CFI = 1.00, RMSEA = 0.00 and SRMR = .03. For the outcome variable distress, being in sample 1 vs. sample 2 did not significantly differentiate the trajectory (z = -1.51, p = .13). However, belonging to a particular sample significantly predicted the intercept for distress (z = 7.35, p < .01), such that participants from the second sample experienced a greater level of distress at the baseline assessment.

Experimental condition was added to the LGM of distress and this variable did not predict intercept (z = 0.69, p = .50), indicating that there were no differences between the control group and the intervention group at baseline. However, the experimental condition did significantly predict the slope of distress, z = -2.19, p = .03, and this model fit the data: χ^2 (6) = 10.27, p = .11, CFI = 0.99, RMSEA = 0.04, and SRMR = .041. Therefore, in the GMM analyses aimed at identifying distinct trajectories of distress, the intervention group and the control group were looked at separately.

The next step was to determine whether any of the demographic, medical, or key psychosocial predictors influence the overall trajectory of distress. Recall that this is an important step in the LGM analyses prior to conducting the growth mixture models, because this can affect the trajectories and final class distributions. Since experimental condition created a significant difference in trajectories, subsequent analyses looked at the control group and intervention group separately.

Intervention Group Distress

Demographic variables were entered into the LGM of distress for the intervention group. Age, education level, menopausal status, and marital status did not significantly influence the intercept or slope of distress for this sample. Ethnicity was then analyzed in the intervention group and found to significantly influence the intercept of distress ($z = -2.28$, $p = .02$), indicating that African-American women had lower levels of distress compared to Caucasian and Hispanic women at baseline. This variable was not predictive of the slope. Next, medical variables were entered into the LGM of distress. Chemotherapy receipt, radiation therapy, tamoxifen therapy, type of surgery, and number of positive lymph nodes were all non-significant in predicting the intercept or slope of distress for the intervention group. Stage was the only medical variable that was significant in predicting the intercept of distress ($z = 2.35$, $p = .02$), such that participants with a higher stage were more likely to experience greater distress at baseline. However, it was not significant in predicting the slope of distress.

Next, the psychosocial variables that were selected as predictors were analyzed. Initial levels of benefit finding did not significantly influence the intercept or slope of distress. Emotional approach coping was analyzed next. The examination of feelings subscale of the EAC was significant in predicting the intercept of distress ($z = 2.36$, p =

.02) indicating that women who scored higher on this subscale experienced more distress at baseline. The examination of feelings subscale was not significant in predicting the slope. The expression of feelings subscale of the EAC was not significant in predicting either the intercept or slope of distress.

Next, the growth mixture models for distress were identified. The first step in running the GMM was to identify how many latent classes best represented the data. Therefore, 5 different models were run, identifying 1 latent class up to 5 latent classes. In each model, the covariates that were tested in the LGM model and found to be significant were included in the GMM analyses. For the intervention group, stage, ethnicity and examination of feelings from the EAC were significantly related to the intercept of distress; therefore they were included when trying to identify the latent class trajectories. Four latent class trajectories best fit the data for distress for the intervention group. Model fitting procedures for the four-class mixture model resulted in log likelihood H0 value of -358.60, a sample-size adjusted BIC of 759.50, and an entropy estimate of .77 (see Table 3).

For class 1, estimates for the intercept, $Mi = 2.80$, $z = 19.12$, $p < .001$, and slope, $Ms = -.048$, $z = -2.00$, $p = .046$, means were significant. For class 2, estimates for the intercept, $Mi = 2.12$, $z = 14.75$, $p < .001$, and slope, $Ms = -.049$, $z = -5.10$, $p < .001$, means were significant. For class 3, estimates for the intercept, $Mi = 1.61$, $z = 15.40$, $p < .001$, and slope, $Ms = -.06$, $z = -5.046$, $p < .001$, means were significant. For class 4, estimates for the intercept, $Mi = 1.90$, $z = 10.76$, $p < .001$, and slope, $Ms = .15$, $z = 3.75$, $p < .001$, means were significant. Class counts and proportion of total sample size for the four latent class model were as follows: 15 (8.7%), 86 (48.5%), 71 (38.4%), and 6

(4.4%), respectively. Figure 4a illustrates the four distinct trajectories that best represented the data for distress for the intervention group.

The next step was to identify whether any of the variables that initially influenced the overall trajectory were able to distinguish among the 4 latent class trajectories for distress. The regression of latent class membership (C) on the predictor variable is characterized by a multinomial logistic regression. In order to compare the classes, the default setting in Mplus is to set the intercept and slope for the last class to zero while regression equations are specified for the first three classes. In order to compare the modal trajectory to the rest of the classes, it was first determined what the modal trajectory was and then this group was made the comparison group. For this variable, class 2 was used as the reference group and the intercept and slope for this class were fixed to zero.

For the intervention group, the predictor variables were stage, ethnicity, and the subscale examination of feelings from the EAC. These were entered simultaneously into a multivariate logistic regression in MPLUS. The logistic regression coefficient for trajectory 2 was fixed to zero to serve as the reference category for these analyses. Model fitting procedures resulted in a log likelihood H0 value of -1392.09, a sample-size adjusted BIC of 2899.03, and an entropy estimate of 0.81. Classification rates changed with the inclusion of the effects of the covariate on the latent class variable. The proportion of individuals in classes 1, 2, 3, and 4 were .23, .39, .29, and .10, respectively.

The logistic regression coefficients for the partial effects of stage on class 1, 3 and 4 were -1.34, $z = -1.86$, $p = .06$, 0.75; $z = 1.61$, $p = .11$; and 0.80, $z = 1.23$, $p = 0.22$, respectively. The negative logistic regression coefficient (-1.34) indicates that there is a tendency for the logit of the probability of belonging to class 1 to increase as stage decreases. Ethnicity (African American vs. everyone else) and examination of feelings were not significant predictors of class trajectory for distress in the intervention group. Examination of feelings was not a significant predictor of class trajectory.

Control Group Distress

Demographic, medical and psychosocial variables were examined to determine their relationship to distress in the control group in an LGM model. Demographic variables were analyzed first. Age, education level, menopausal status, and marital status did not predict either the intercept or slope of distress in the control group. Ethnicity (African American vs. others) again was found to influence the intercept of distress (z = 2.44, p = .02), such that African-American women were likely to experience more distress at baseline compared to Caucasian women. There was also tendency toward an effect of ethnicity on trajectory (z = 1.85, p = .06). None of the medical variables significantly influenced either the intercept or slope of distress for the control group. Benefit finding did not significantly influence the intercept or slope of distress. The expression of feelings subscale and the examination of feelings subscale of the EAC significantly predicted the intercept of distress (z = 2.64, p = .001 and z = 2.52, p = .01, respectively), but not the slope. Women in the control group who had higher scores on both subscales of the EAC were more likely to experience greater distress at baseline.

Next, the growth mixture models for distress for the control group were identified. For this group, ethnicity and both subscales of the EAC were significantly related to the intercept of distress; therefore they were included when trying to identify the latent class trajectories. Four latent class trajectories best fit the data for distress for the control group. Model fitting procedures for the four-class mixture model resulted in log likelihood H0 value of -491.38, a sample-size adjusted BIC of 1027.18, and an entropy estimate of .68 (see Table 4).

For class 1, estimates for the intercept, Mi = 3.45, z = 12.55, $p < .001$, and slope, Ms = -0.27, z = -2.95, $p < .001$, means were significant. For class 2, estimates for the intercept mean, Mi = 2.327, z = 8.81, $p < .001$, was significant, but the mean for the slope, Ms = 0.11, z = 1.745, p = .08, was not significant. For class 3, estimates for the intercept mean, Mi = 2.84, z = 6.40, $p < .001$, was significant, but the slope, Ms = -0.04, z = -0.40, p = .69, mean was not significant. For class 4, estimates for the intercept, Mi = 1.97, z = 14.31, $p < .001$, and slope, Ms = -0.05, z = -5.44, $p < .001$, means were significant. Class counts and proportion of total sample size for the four latent class model were 8 (4.6%), 28 (16.4%), 40 (22.4%), and 121 (56.6%), respectively. Figure 5a illustrates the four distinct trajectories that best represented the data for distress for the control group.

The next step was to determine whether any of the variables that initially influenced the overall trajectory were able to distinguish between the latent class trajectories. For the control group, these variables were ethnicity (African American vs. others), and the subscale examination of feelings and the subscale expression of feeling from the EAC. The logistic regression coefficient for the last class was fixed to zero to serve as the reference category. The predictor variables were entered simultaneously into a multivariate logistic regression in MPLUS. Model fitting procedures resulted in a log likelihood H0 value of -1631.39, a sample-size adjusted BIC of 3383.35, and an entropy estimate of 0.84. Classification rates changed with the inclusion of the effects of the covariate on the latent class variable. The proportion of individuals in classes 1, 2, 3, and 4 were .16, .44, .05, and .35, respectively. Figure 5b illustrates the four distinct trajectories that best represented the data for distress for the control group when the predictors were included in the model.

The logistic regression coefficients for the partial effects of expression of feelings on class 1, 2 and 3 were -0.07, $z = -0.73$, $p > .50$; 0.09, $z = 1.25$, $p = .21$; and -0.44, $z = -2.00$, $p < .05$, respectively. The negative logistic regression coefficient (-0.44) indicates that the logit of the probability of membership in class 3 increases as expression of feelings decreases. The logistic regression coefficients for the partial effects of Examination of Feelings on class 1, 2 and 3 were -.06, $z = -.54$, $p = .59$; -0.14, $z = -2.10$, $p = .04$; and 0.38, $z = 2.16$, $p = .03$, respectively. The negative logistic regression coefficient (-0.14) indicates that the logit of the probability of membership in class 2 increases as examination of feelings decreases. The positive logistic regression coefficient (0.38) indicates that the logit of the probability of membership in class 3 increases as examination of feelings increases. Ethnicity (African-American vs. everyone else) was not significant in distinguishing between the latent class trajectories.

IES Intrusion

First, an initial LGM model was specified identifying a trajectory of 0, 3, 6, and 12 months. This model did not fit the data and a model testing the quadratic trend was specified. This model also did not fit the data; therefore another model allowing time 4 to be freely estimated was tested. This model did not fit the data either; therefore the original LGM of 0, 3, 6, and 12 months was retained: χ^2 (5) = 143.28, *p* = .00, CFI = .63, RMSEA = .00, and SRMR = .23.

To determine whether there was a significant difference in the overall trajectory between participants in the first sample vs. the second sample, sample was added to the LGM model. This model did not fit the data: χ^2 (7) 156.19, *p* = .00, CFI = 0.61, RMSEA = 0.00 and SRMR = 0.18. For IES intrusion, subsample did not significantly predict the intercept (z = -.47, p > .50) or the slope (z = -1.693, p = .09).

Experimental condition was then added to the original model to determine whether this influenced the trajectory of IES Intrusion. Experimental condition did not significantly predict the intercept of IES intrusion (z = -.33, p > .50); however, it did predict the overall trajectory (z = -2.66, p < .001). Therefore, in subsequent analyses, intervention and control groups were analyzed separately.

Intervention Group IES Intrusion

Demographic variables were entered into the LGM of IES intrusion for the intervention group. Age, ethnicity, menopausal status and marital status did not significantly predict the intercept or slope of IES intrusion. Educational level predicted the intercept (z = -2.02, p = .04), such that women with lower levels of education were more likely to experience higher levels of IES intrusion. Educational level did not predict the slope of IES intrusion. Chemotherapy, tamoxifen therapy, type of surgery, stage, and number of positive lymph nodes were found not to relate to IES intrusion. Radiation therapy was close to predicting the slope for the intervention group (z = 1.92, p = .055), but not the intercept of IES intrusion. Initial benefit finding did not significantly predict the intercept or slope of IES intrusion. The examination of feelings subscale of the EAC predicted the intercept ($z = 2.98$, $p < .01$) indicating that higher scores on this subscale were related to higher levels of IES intrusion at baseline. This subscale did not predict the slope of IES intrusion. The expression of feelings subscale did not predict IES intrusion.

Next, the growth mixture models for IES intrusion for the intervention group were identified. For the intervention group, education and the examination of feelings subscale of the EAC were significantly related to the intercept of distress; radiation therapy was significant in predicting the slope; therefore these variables all were included when trying to identify the latent class trajectories. Two latent class trajectories best fit the data for IES intrusion for the intervention group. Model fitting procedures for the two-class mixture model resulted in log likelihood H0 value of -671.24, a sample-size adjusted BIC of 1372.71, and an entropy estimate of 0.82. See Table 5.

For class 1, the estimate for the intercept, $Mi = 2.44$, $z = 5.44$, $p < .001$, mean was significant, but the estimate for the slope, $Ms = 0.01$, $z = 0.38$, $p = 0.71$, mean was not significant. For class 2, estimates for the intercept, $Mi = 1.62$, $z = 4.33$, $p < .001$, and the slope, $Ms = -0.11$, $z = -10.59$, $p < .001$, were significant. Class counts and proportion of total sample size for the two latent class models were 21 (14.2 %) and 157 (85.8 %), respectively. Figure 6a illustrates the two distinct trajectories that best represented the data for IES intrusion for the intervention group.

The next step was to identify whether any of the variables that initially influenced the overall trajectory were able to distinguish between the latent class trajectories. For the intervention group, these variables were education, radiation therapy, and the subscale examination of feelings from the EAC. These variables were all entered into the same model to determine whether they significantly differentiated between the latent class trajectories. The logistic regression coefficient for the second class was fixed to zero to serve as the reference category for these analyses. Model fitting procedures resulted in a log likelihood H0 value of -1748.97, a sample-size adjusted BIC of 3558.39, and an entropy estimate of 0.77. Classification rates changed with the inclusion of the effects of the covariates on the latent class variable. The proportions of individuals in classes 1 and 2 were .43 and .57, respectively. Figure 6b illustrates the two distinct trajectories that best represented the data for IES intrusion for the intervention group when the predictor variables were added to the model.

The logistic regression coefficients for the partial effects of education on class 1 was -0.14, $z = -1.86$, $p = .06$. Education was close to significance in distinguishing between the latent class trajectories. The negative logistic regression coefficient (-0.14) indicates that the logit probability of membership in class 1 increases as education decreases. The logistic regression coefficients for the partial effects of radiation therapy on class 1 was -0.76, $z = 2.03$, $p = .04$. Radiation therapy was significant in distinguishing between the latent class trajectories. The negative logistic regression coefficient (-0.76) indicates that the logit probability of membership in class 1 increases and for participants who did not receive radiation treatment. The logistic regression coefficients for the partial effects of examination of feelings on class 1 was -0.08, $z = -1.94$, $p = .05$. Examination of feelings was close to distinguishing between the latent class trajectories. The negative logistic regression coefficient (-0.08) indicates that the probability of membership in class 1 increases as examination of feelings decreases.

Control Group IES Intrusion

The same analyses were run for participants in the control group to determine whether the demographic, medical and psychosocial variables significantly related to the LGM trajectory of IES intrusion. Age, education level, menopausal status, and marital status were analyzed first. Age and marital status significantly predicted the intercept ($z = -3.01$, $p < .01$ and $z = 2.35$, $p = .02$ respectively), but not the slope of IES intrusion. Younger women were more likely to experience higher levels of intrusive thoughts at baseline. Also, married women were more likely to experience intrusive thoughts at baseline. Educational level did not predict the intercept; however, it did significantly predict the slope ($z = 2.95$, $p < .01$), indicating that women with higher levels of education had a slower decrease in their levels of IES intrusion over time. Menopausal status did not predict either the intercept or slope of distress. Ethnicity also did not relate to the intercept or slope of this variable. Tamoxifen therapy was the only medical variable that significantly predicted the intercept and slope of IES intrusion in the control group ($z= -2.63$, $p = .01$ and $z = 2.01$, $p = .04$, respectively). Women who received tamoxifen therapy during the course of the entire study had lower levels of intrusive thoughts at baseline but their levels of intrusive thoughts decreased at a slower rate compared to women who did not receive tamoxifen therapy. Chemotherapy, radiation therapy, type of surgery, stage and nodes did not predict the intercept or trajectory of this variable.

Next, the psychosocial variables that were selected as predictors were analyzed. Benefit finding did not significantly predict the intercept or slope of IES intrusion. The examination of feelings subscale of the EAC was significant in predicting the intercept of distress ($z = 2.93$, $p < .01$), such that women who had higher scores on the examination of feelings subscale at baseline also were more likely to have more intrusive thoughts at baseline. This variable did not influence the slope. The expression of feelings subscale of the EAC was not significant in predicting either the intercept or slope of IES intrusion.

Next, the growth mixture models for IES intrusion for the control group were identified. For this group, tamoxifen therapy, age, marital status and the examination of feelings subscale of the EAC were significantly related to the intercept of IES intrusion and tamoxifen therapy and education were significantly related to the slope. Therefore these variables were included as covariates when trying to identify the latent class trajectories. Three latent class trajectories best fit the data for IES intrusion for the control group. Model fitting procedures for the three-class mixture model resulted in log likelihood H0 value of -749.11, a sample-size adjusted BIC of 1542.64, and an entropy estimate of 0.79 (see Table 6).

For class 1, estimates for the intercept, $Mi = 1.80$, $z = 4.82$, $p < .001$ and slope, $Ms = -0.15$, $z = -12.81$, $p < .001$, means were significant. For class 2, estimates for the intercept, $Mi = 3.60$, $z = 8.19$, $p < .001$, and the slope, $Ms = -0.05$, $z = -2.22$, $p = .03$, were significant. For class 3, estimates for the intercept, $Mi = 2.91$, $z = 7.06$, $p < .001$, and the slope, $Ms = -0.11$, $z = - 8.58$, $p < .001$, were significant. Class counts and proportion of total sample size for the three latent class models were 112 (56.4%), 18 (11.5%) and 67 (32.1%), respectively. Figure 7a illustrates the three distinct trajectories that best represented the data for IES intrusion for the control group.

The next step was to identify whether any of the variables that initially influenced the overall trajectory were able to distinguish between the latent class trajectories. For the control group, these variables were age, education, marital status, tamoxifen therapy, and examination of feelings. The first class was used as the reference group since this was the modal trajectory. Therefore, the logistic regression coefficient for the first class was fixed to zero to serve as the reference category in these analyses. Model fitting procedures resulted in a log likelihood H0 value of -1910.94, a sample-size adjusted BIC of 3946.68, and an entropy estimate of 0.85. Classification rates changed with the inclusion of the covariates on the latent class variable. The proportions of individuals in classes 1, 2, and 3 were .47, .12, and .42, respectively. Figure 7b illustrates the three distinct trajectories that best represented the data for IES intrusion for the control group.

Age, education level, marital status, and tamoxifen therapy were not significant in distinguishing between the latent class trajectories. The examination of feelings subscale was significant in distinguishing between the latent class trajectories for IES Intrusion. The logistic regression coefficients for the partial effects of examination of feelings on class 2 and 3 were 0.23, $z = 2.80$, $p = .01$ and -0.15, $z = - 2.90$, $p < .01$, respectively. The positive logistic regression coefficient (0.23) indicates that the probability of membership in class 2 increases as examination of feelings increases. The negative logistic regression coefficient (-0.15) indicates that that probability of membership in class 3 increases as examination of feelings decreases.

IES Avoidance

In the analysis of IES avoidance, the initial LGM model specified a trajectory of 0, 3, 6, and 12 months. This model did not fit the data; therefore time 4 was allowed to be freely estimated. This model fit did not fit the data either. Next a model testing the quadratic trend was specified. This model did not fit the data well; therefore, the model specifying the trajectory as 0, 3, 6, and 12 was retained: χ^2 (5) = 81.29, *p* = .00, CFI = 0.71, RMSEA = .00, and SRMR = 0.19.

To determine whether there was a significant difference in the overall trajectory between participants in the first sample vs. the second sample, sample was added to the LGM model. This model did not fit the data well: χ^2 (7) 143.25, *p* = .00, CFI = 0.60, RMSEA = 0.00 and SRMR = .126. For IES avoidance, being in the first sample vs. the second sample significantly predicted the intercept (z = -3.51, p < .001), but not the slope (z = 1.76, p = .08). Women in sample 1 were more likely to experience higher levels of IES avoidance at baseline. Experimental condition did not significantly predict intercept (z = -0.91, p = .36) or the slope of IES Avoidance (z = .31, p > .50). Therefore, in the GMM analyses aimed at identifying distinct trajectories, the intervention group and the control group were not separated.

Next, the demographic, medical, and psychosocial variables of interest were added to the LGM of IES avoidance to determine their influence on the trajectory. Age, menopausal status, and marital status did not significantly influence either the intercept or trajectory of IES avoidance. Education level was related to the intercept (z = 2.13, p = .03), but not the overall trajectory. Ethnicity (defined as Hispanic vs. all others) was related only to the slope of IES avoidance (z = 2.19, p = .03), suggesting that Hispanic women had a faster rate of decline in their levels of IES avoidance compared to Caucasian and African American women. Medical variables were looked at next. Chemotherapy, radiation therapy, tamoxifen therapy, type of surgery, number of positive lymph nodes, and stage were all unrelated to IES Avoidance. Upon examining the influence of the psychosocial variables, it was found that benefit finding did not predict

IES avoidance. Both the expression of feelings and examination of feelings subscales of the EAC significantly predicted the intercept but not the slope of IES avoidance ($z = -5.63$, $p < .001$ and $z = 3.93$, $p < .001$, respectively). Women with lower levels of expression and examination of feelings at baseline were more likely to have higher levels of IES avoidance at baseline.

Next, the growth mixture models for IES Avoidance were identified. Sample size for these analyses was 376. The first step in running the GMM was to identify how many latent classes best represented the data. When the model was run identifying 5 possible latent classes, the program would not run, reporting that the model could not be identified. In each model, the covariates that were tested in the LGM model and found to be significant were included in the GMM analyses. For IES avoidance, these variables were as follows: education and both subscales of the EAC were significantly related to the intercept and ethnicity significantly predicted the slope. Therefore, these variables were included as covariates when trying to identify the latent class trajectories. Four latent class trajectories best fit the data for IES avoidance. Model fitting procedures for the four-class mixture model resulted in log likelihood H0 value of -1289.804, a sample-size adjusted BIC of 2642.95, and an entropy estimate of 0.76. See Table 7.

For class 1, estimates for the intercept, $M_i = 1.48$, $z = 11.04$, $p < .001$, and slope, $M_s = -0.08$, $z = -8.35$, $p < .001$, means were significant. For class 2, estimates for the intercept, $M_i = 2.10$, $z = 5.60$, $p <.001$, and slope, $M_s = 0.06$, $z = 2.61$, $p =.001$, means were significant. For class 3, the estimate for the mean intercept, $M_i = 1.90$, $z = 10.02$, $p < .001$, was significant; however, the estimate for the mean slope, $M_s = -0.02$, $z = -1.34$, $p = .18$, was not significant. For class 4, estimates for the mean intercept, $M_i = 2.68$, $z =$

10.46, p < .001, and slope, Ms = 0.11, z = 5.22, p < .001, were significant. Class counts and proportion of total sample size for the four latent class model were 241 (57.9%), 34 (11.8%), 92 (27.5%), and 8 (2.8%), respectively. Figure 8a illustrates the four distinct trajectories that best represented the data for IES avoidance.

The next step was to identify whether any of the variables that initially influenced the overall trajectory were able to distinguish among the latent class trajectories. For IES avoidance, these variables were education, ethnicity (Hispanic vs. others), and both subscales of the EAC. The logistic regression coefficient for the first class was fixed to zero to serve as the reference category. Model fitting procedures resulted in a log likelihood H0 value of -3506.86, a sample-size adjusted BIC of 7228.54, and an entropy estimate of 0.80. Classification rates changed with the inclusion of the effects of the covariates on the latent class variable. The proportion of individuals in classes 1, 2, 3, and 4 were .22, .25, .42, and .11. Figure 8b illustrates the four distinct trajectories that best represented the data for IES avoidance when predictors were added to the model.

Education level, ethnicity, and expression of feelings did not significantly distinguish among the latent class trajectories. The only variable that was significant in distinguishing trajectories was examination of feelings. The logistic regression coefficients for the partial effects of examination of feelings on class 2, 3, and 4 were -0.07, z = -1.16, p = .25; -0.13, z = -2.62, p < .01; and 0.06, z = 0.80, p > .50, respectively. The negative logistic regression coefficient (-0.13) indicates that the logit of the probability of membership in class 2 increases with lower scores on examination of feelings.

Positive Psychological Adjustment

Positive Engagement. In the analyses of positive engagement, the initial LGM model specified a trajectory of 0, 3, 6, and 12 months. This specification did fit the data: χ^2 (5) = 10.74, p = .06, CFI = .99, RMSEA = .06, and SRMR = .06. Another model was estimated to determine if allowing time 4 to be freely estimated would improve model fit. This model did not significantly improve model fit: χ^2 (4) = 10.39, p = .03, CFI = .99, RMSEA = .07, and SRMR = .06. Next a model specifying the quadratic trend was estimated. This model did not fit the data. Therefore, the model specifying time as 0, 3, 6, and 12 was retained.

To determine whether there was a significant difference in the overall trajectory between participants in the sample 1 vs. sample 2, this variable was added to the LGM model. This model fit the data: χ^2 (7) 9.76, p = .02, CFI = 0.99, RMSEA = 0.03 and SRMR = .05. For positive engagement, being in sample 1 vs. sample 2 did not significantly differentiate the trajectories (z = -1.67, p = .09). However, this variable significantly predicted the intercept for positive engagement (z = 4.47, p < .01), such that women who were in the second sample were more likely to have higher levels of positive engagement at baseline.

Next experimental condition was added to the original model to determine whether this influenced the trajectory of positive engagement. Experimental condition did not predict intercept (z = -1.03, p = .30), indicating success of randomization. Condition did significantly predict slope, z = 2.716, p = .001, although this model did not provide good fit: χ^2 (7) = 17.02, p = .02, CFI = 0.98, RMSEA = 0.06, and SRMR = .05.

Therefore, in the GMM analyses aimed at identifying distinct trajectories, the intervention group and the control group were analyzed separately.

The next step was to determine if any of the predictor variables influenced the overall trajectory of positive engagement. Since there was a significant difference in trajectories by experimental condition, the remaining analyses analyzed the control group and intervention group separately.

Intervention Group Positive Engagement

Demographic variables were entered into the LGM of positive engagement for the intervention group. Age, education level, menopausal status, ethnicity, and marital status did not significantly predict the intercept or slope of positive engagement for this subsample. Next, medical variables were entered into the LGM of positive engagement. Chemotherapy receipt, radiation therapy, tamoxifen therapy, type of surgery, and number of positive lymph nodes were all non-significant in predicting the intercept or slope of positive engagement for the intervention group. Stage was the only medical variable that predicted the intercept of positive engagement ($z = -2.10$, $p = .04$), but it was not significant in predicting the slope. Women who had a lower stage of breast cancer were more likely to have higher levels of positive engagement at baseline.

Next, the psychosocial variables that were selected as predictors were analyzed in the LGM. Benefit finding significantly predicted the intercept ($z = 2.41$, $p = .02$) and slope ($z = -1.99$. $p = .046$) of positive engagement. The examination of feelings subscale of the EAC did not predict the intercept or slope of positive engagement. The expression of feelings subscale of the EAC predicted the intercept ($z = 2.91$, $p < .01$), but not the slope of positive engagement. Higher levels on the expression of feelings subscale at baseline was associated with more positive engagement at baseline.

Next, the growth mixture models for positive engagement for the intervention group were identified. For this group, stage, benefit finding, and the expression of feelings subscale of the EAC were significantly related to the intercept of positive engagement, and benefit finding was also significant in predicting the slope; therefore, these variables were included as covariates when trying to identify the latent class trajectories. Three latent class trajectories best fit the data for positive engagement for the intervention group. Model fitting procedures for the three-class mixture model resulted in log likelihood H0 value of -520.34, a sample-size adjusted BIC of 1079.07, and an entropy estimate of 0.77. See Table 8.

For class 1, estimates for the intercept, $Mi = 1.68$, $z = 8.18$, $p < .001$, and the slope, $Ms = 0.11$, $z = 4.29$, $p < .001$, means were significant. For class 2, estimates for the intercept, $Mi = 2.81$, $z = 13.66$, $p < .001$, and the slope, $Ms = 0.05$, $z = 3.20$, $p = .001$, were significant. For class 3, the estimate for the intercept, $Mi = 3.66$, $z = 15.71$, $p < .001$, mean was significant, but the intercept for the slope, $Ms = 0.03$, $z = 1.40$, $p = .16$, mean was not significant. Class counts and proportion of total sample size for the three latent class models were 25 (15%), 138 (74.3%) and 16 (10.7%), respectively. Figure 9a illustrates the three distinct trajectories that best represented the data for positive engagement for the intervention group.

The next step was to identify whether any of the variables that initially influenced the overall trajectory distinguished among the latent class trajectories. For the intervention group, these variables were stage, benefit finding, and the expression of feelings subscale of the EAC. The logistic coefficient for the second class was fixed to zero to serve as the reference category for these analyses. All of the predictor variables were entered into the same model. Model fitting procedures resulted in a log likelihood H0 value of -1587.17, a sample-size adjusted BIC of 3261.22, and an entropy estimate of 0.77. Classification rates changed with the inclusion of the effects of the covariate on the latent class variable. The proportion of individuals in classes 1, 2, and 3 were .17, .44, and .39, respectively. Figure 9b illustrates the three distinct trajectories that best represented the data for positive engagement for the intervention group when predictors were added to the model.

The logistic regression coefficients for the partial effects of stage on class 1 and 3 were -2.13, $z = -2.62$, $p = .01$ and 1.16, $z = 1.61$, $p = .11$, respectively. Stage was significant in distinguishing between the latent class trajectories for positive engagement. The negative logistic regression coefficient (-2.13) indicates that the logit of the probability of membership in class 1 increases as stage decreases. The logistic regression coefficients for the partial effects of benefit finding on class 1 and 3 were -2.79, $z = -3.13$, $p < .01$ and -1.00, $z = -1.80$, $p = .07$, respectively. Expression of feelings was not significant in distinguishing between the latent class trajectories for positive engagement.

Control Group Positive Engagement

The same analyses were run for participants in the control group to determine whether the demographic, medical, and psychosocial variables significantly related to the LGM trajectory of positive engagement. Demographic variables were analyzed first. Age, education level, menopausal status, ethnicity, and marital status did not predict either the intercept or slope of positive engagement in the control group. None of the medical variables significantly predicted either the intercept or slope of distress for the control group. Benefit finding significantly predicted the intercept ($z = 3.05$, $p < .01$), but not the slope of positive engagement, suggesting that higher levels of benefit finding was associated with higher levels of positive engagement at baseline. The expression of feelings subscale of the EAC predicted the intercept ($z = 4.38$, $p < .001$), but not the slope. Higher scores on the expression of feelings subscale was related to higher levels of positive engagement at the start of the study. The examination of feelings subscale did not predict either the intercept or slope of positive engagement.

Next, the growth mixture models for positive engagement for the control group were identified. For the control group, benefit finding and the expression of feelings subscale from the EAC were significantly related to the intercept of positive engagement in the LGM. Therefore, these variables were included as covariates when trying to identify the latent class trajectories. The first step in running the GMM was to identify how many latent classes best represented the data. Therefore, 5 different models were run identifying 1 latent class up to 5 latent classes. When the model was run identifying 5 possible latent classes, the program would not run, reporting that the model was unable to be identified. Two latent class trajectories best fit the data for positive engagement for the control group. Model fitting procedures for the two-class mixture model resulted in log likelihood H0 value of -566.49, a sample-size adjusted BIC of 1160.47, and an entropy estimate of 0.42. See Table 9.

For class 1, the estimate for the intercept, $Mi = 2.00$, $z = 9.20$, $p < .001$, mean was significant but the intercept for the slope, $Ms = -0.01$, $z = -0.60$, $p = .55$, mean was not significant. For class 2, estimates for the intercept, $Mi = 2.54$, $z = 11.98$, $p < .001$, and the slope, $Ms = 0.03$, $z = 4.30$, $p < .001$, were significant. Class counts and proportion of total sample size for the two latent class models were 86 (45%) and 111 (55%), respectively. Figure 10a illustrates the two distinct trajectories that best represented the data for positive engagement for the control group.

The next step was to identify whether any of the variables that initially influenced the overall trajectory distinguished between the latent class trajectories. For the control group, these variables were benefit finding and the expression of feelings subscale of the EAC. These variables were entered into the same model. The logistic regression coefficient for the second class was fixed to zero to serve as the reference category in these analyses. Model fitting procedures resulted in a log likelihood H0 value of -1743.07, a sample-size adjusted BIC of 3539.03, and an entropy estimate of 0.77. Classification rates changes with the inclusion of the effects of the covariates of the latent class variable. The proportion of individuals in classes 1 and 2 were .50 and .50. Figure 10b illustrates the two distinct trajectories that best represented the data for positive engagement for the control group when the predictors were added to the model. Benefit finding and expression of feelings were not significant in distinguishing between the latent class trajectories for positive engagement.

Physical Adjustment

FACT Physical Well-Being

The sample size for this set of analyses was 240 participants. The physical adjustment outcome variables were available only for participants in sample 2, who were assessed at four time points over the span of 18 months. These assessments were conducted at entry study entry (baseline), 6 months after entering the study, 12 months, and 18 months after entering the study. First, an initial LGM model was specified identifying a trajectory of 0, 6, 12, and 18 months. This model did not fit the data; therefore time 4 was allowed to be freely estimated. This model did fit the data; therefore this model was retained: χ^2 (4) = 3.80, *p* = .43, CFI = 1.00, RMSEA = .69, and SRMR = .08. Time 4 was estimated at 13.24 months.

To determine whether there was a significant difference in the overall trajectory between participants in the experimental condition vs. the control condition, this variable was added to the LGM model. This model did not fit the data: χ^2 (6) 26.35, *p* = .00, CFI = 0.92, RMSEA = 0.01 and SRMR = 0.10. For FACT physical functioning, experimental condition did not significantly predict the intercept (z = 1.01, p = .31), but it did significantly predict the slope (z = -4.54, p < .001). Since experimental condition significantly predicted the slope of this variable, further analyses were unable to be conducted. The reason for this is because the sample would have to be separated based on experimental condition. This would not provide a sufficient sample size to run further analyses using growth mixture modeling.

FACT Functional Well-Being

First, an initial LGM model was specified identifying a trajectory of 0, 6, 12, and 18 months. This model did not fit the data; therefore time 4 was allowed to be freely estimated. This model did fit the data; therefore the model allowing time 4 to be freely estimated was retained: χ^2 (4) = 3.50, *p* = .483, CFI = 1.00, RMSEA = .72, and SRMR = .04. Time 4 was estimated at 12.01 months.

To determine whether there was a significant difference in the overall trajectory between participants in the experimental condition vs. the control condition, this variable was added to the LGM model. This model fit the data: χ^2 (6) 5.54, *p* = .48, CFI = 1.00, RMSEA = 0.77 and SRMR = 0.03. For FACT functional well being, experimental condition significantly predicted the intercept (z = -2.18, p = .03) and the slope (z = 3.825, p < .001). Since experimental condition significantly predicted the slope of this variable, further analyses were unable to be conducted due to an insufficient sample size for growth mixture modeling since the sample would have to be analyzed separately based on experimental condition.

Fatigue Symptom Inventory Severity

First, an initial LGM model was specified identifying a trajectory of 0, 3, 6, 12, and 18 months. This model did not fit the data; therefore time 4 was allowed to be freely estimated. This model did fit the data either. Finally a model testing a quadratic trajectory was analyzed. This did not fit the data either; therefore the original model specifying 0, 3, 6, 12, and 18 months was retained: χ^2 (10) = 95.16, p < .01, CFI = 0.81, RMSEA = 0.00, and SRMR = .04.

To determine whether there was a significant difference in the overall trajectory between participants in the experimental condition vs. the control condition, this variable was added to the LGM model. This model did not fit the data either: χ^2 (13) 86.14, p = .00, CFI = 0.86, RMSEA = 0.00 and SRMR = 0.18. For fatigue severity, experimental condition significantly predicted the intercept (z = 6.32, p < .001) and the slope (z = 4.66, p < .001). Since experimental condition significantly predicted the slope of this variable, further analyses were unable to be conducted due to an insufficient sample size for growth mixture modeling since the sample would have to be analyzed separately based on experimental condition.

Fatigue Symptom Inventory Disruption

First, an initial LGM model was specified identifying a trajectory of 0, 3, 6, 12, and 18 months. This model did not fit the data; therefore time 4 was allowed to be freely estimated. This model did fit the data either. Finally a model testing a quadratic trajectory was analyzed. This did not fit the data either; therefore the original model specifying 0, 3, 6, 12, and 18 months was retained: χ^2 (10) = 44.27, $p < .01$, CFI = 0.89, RMSEA = 0.00, and SRMR = .07.

To determine whether there was a significant difference in the overall trajectory between participants in the experimental condition vs. the control condition, this variable was added to the LGM model. This model did not fit the data either: χ^2 (13) 46.07, p = .00, CFI = 0.89, RMSEA = 0.00 and SRMR = 0.06. For, fatigue disruption, experimental condition did not significantly predict the intercept (z = -0.40, p > .50) or the slope (z = -0.97, p = .33). Since the experimental condition did not significantly predict either the intercept or slope of FSI disruption, further analyses were conducted using the entire sample.

Next, the demographic, medical, and psychosocial variables of interest were added to the LGM of FSI disruption to determine their relations to the trajectory. Menopausal status and marital status did not significantly influence either the intercept or trajectory of FSI disruption. Age and education level both related to the intercept (z = -2.60, p = .01 and z = -1.95, p = .05), but not the overall trajectory. Younger women and women with lower levels of education were more likely to experience greater disruption related to fatigue at baseline. Ethnicity was not related to either the intercept or slope of FSI disruption. Medical variables were analyzed next. Chemotherapy was significantly related to the intercept of FSI disruption ($z = 5.56$, $p < .001$) and it predicted the slope ($z = -2.78$, $p = .01$). Women who received chemotherapy during the course of the study were more likely to have higher scores on FSI disruption at baseline, but their levels of disruption from fatigue declined at a faster rate compared to women who did not receive chemotherapy. Stage was related to the intercept ($z = 3.43$, $p < .001$), but not the slope of FSI disruption. Higher stage of breast cancer was associated with higher levels of disruption from fatigue. The number of positive lymph nodes was not related to the intercept ($z = .11$, $p > .50$), however, it did significantly predict the slope ($z = -2.22$, $p = .03$). Women who had more positive lymph nodes had a faster rate of decline in their levels of distress. Radiation therapy, tamoxifen therapy, and type of surgery were not related to FSI disruption.

Upon examining the influence of the psychosocial variables, it was found that expression of feelings and examination of feelings were both related to the intercept of FSI disruption ($z = -2.40$, $p = .02$ and $z = 2.13$, $p = .03$), but they did not predict the slope. Higher scores on the EAC were associated with higher levels of disruption at baseline. The social and family well-being subscale of the FACT was significant in predicting the intercept for FSI disruption ($z = -3.08$, $p < .01$), but not the slope ($z = -0.23$, $p > .50$). Women with higher scores on the social and family-well being subscale had lower levels of disruption at baseline. Benefit finding was not related to the intercept or slope of this variable.

Next, the growth mixture models for FSI disruption were identified. Sample size for these analyses was 240. The first step in running the GMM was to identify how many latent classes best represented the data. In each model, the covariates that were tested in the LGM model and found to be significant were included in the GMM analyses. For FSI disruption, these variables were age, education, chemotherapy receipt, stage, both subscales of the EAC, and the social and family well-being subscale of the FACT, chemotherapy receipt, and number of positive lymph nodes.

Two latent class trajectories best fit the data for FSI disruption. Model fitting procedures for the two-class mixture model resulted in log likelihood H0 value of -1505.52, a sample-size adjusted BIC of 3061.13, and an entropy estimate of 0.85. See Table 10.

For class 1, estimates for the intercept, $M_i = 4.15$, $z = 1.29$, $p = .20$, and slope, $M_s = -0.05$, $z = .01$, $p < .001$, means were not significant. For class 2, estimates for the intercept, $M_i = 5.24$, $z = 1.64$, $p = .10$, and slope, $M_s = 0.09$, $z = .03$, $p > .50$, means were not significant. Class counts and proportion of total sample size for the two latent class model were 216 (91.1%) and 16 (8.9%), respectively. Figure 11a illustrates the two distinct trajectories that best represented the data for FSI disruption.

The next step was to identify whether any of the variables that initially influenced the overall intercept and trajectory were able to distinguish between the latent class trajectories. For FSI disruption, these variables were age, education, number of positive lymph nodes, chemotherapy receipt, stage, both subscales of the EAC, and the social and family well-being subscale of the FACT. The logistic regression coefficient for the first class was fixed to zero to serve as the reference group. Model fitting procedures resulted in a log likelihood H0 value of -2798.48, a sample-size adjusted BIC of 5724.73, and an entropy estimate of 0.81. Classification rates changed with the inclusion of the effects of the covariates on the latent class variable. The proportion of individuals in classes 1 and

2 were .55 and .45. Figure 11b illustrates the two distinct trajectories that best represented the data for FSI disruption when the predictor variables were added to the model.

The logistic regression coefficients for the partial effects of age, number of positive lymph nodes, education, chemotherapy receipt, stage, and expression of feelings were all not significant in distinguishing between the two latent class trajectories. Examination of feelings was close to significant. The logistic regression coefficient for the partial effect of examination of feeling on class 2 was 0.09, $z = 1.88$, $p = .06$. The positive logistic regression coefficient (0.09) indicates that the logit of the probability of membership in class 2 increases as examination of feelings increases. The social and family well-being subscale of the FACT was also significant in distinguishing between the two trajectories. The logistic regression coefficients for the partial effects of social and family well-being on class 2 was 0.73, $z = 1.97$, $p =.049$. The positive logistic regression coefficient (0.73) indicates that the logit of the probability of membership in class 2 increases as social and family well being increases.

Overlap Between Trajectories

The final aim for this study was to determine the extent to which the groupings obtained in the various analyses overlapped. That is, did the grouping of trajectories for the negative psychological adjustment variables overlap with the groupings of trajectories for the positive psychological adjustment variable. Also, comparisons between the trajectories for the physical functioning variables and the trajectories for the negative and positive psychological adjustment variables were conducted. Participants were classified into their most likely trajectory group and chi-square analyses were conducted.

Comparisons were made between the groups after all the predictors and covariates were included in the model (i.e., the trajectory groupings identified in figures b). Analyses were conducted separately as a function of intervention status.

Intervention Group

First comparisons were made between the groupings of the negative psychological adjustment variables (distress, IES intrusion, and IES avoidance). Chi-square analyses were conducted to determine whether the groupings of the negative psychological outcome variables were similar or if they overlapped. A significant chi-square analysis suggest that there is a significant relationship between the row and column data indicating that they are not merely related by chance. A non-significant chi-square analysis would therefore indicate that there is not a relationship between the row and column data (Tabachnick & Fidell, 2001).

When comparing the groupings for distress and IES intrusion the chi-square was large and significant, χ^2 (3, 178) = 123.54, $p < .001$, suggesting that the groupings of the distress trajectories overlapped with the groupings for the IES intrusion trajectories (See Table 11). The next comparison was made between the groupings of distress and those of IES avoidance. The chi-square for this comparison was also significant, χ^2 (9, 178) = 124.88, $p < .001$ (See Table 12). The last comparison was made between the groupings of IES intrusion and those of IES avoidance. This test was also significant, χ^2 (3, 178) = 121.22, $p < .001$ (See Table 13).

Comparisons were then made between the positive psychological adjustment groupings and the negative psychological adjustment groupings. When comparing the groupings of the positive engagement trajectories to those of distress, the chi-square was significant, χ^2 (6, 178) = 162.64, $p < .001$, suggesting that the groupings of the positive engagement trajectories overlapped with groupings for distress. The results are shown in Table 14, which displays the number of participants in each cell. The greatest overlap occurred for positive engagement trajectory 2, the group that had the lowest level of positive engagement, and distress trajectory 2, the group that had the lowest levels of distress.

Next the groupings for the positive engagement trajectories were compared to the groupings for the IES intrusion trajectories. The chi-square analysis was significant, χ^2 (2, 178) = 150.92, $p < .001$, suggesting that the groupings of the positive engagement trajectories overlapped with the groupings for IES intrusion (see Table 15). The greatest overlap occurred between positive engagement trajectory 2, the group with the lowest level of positive engagement, and IES intrusion trajectory 1, the group with higher levels of IES intrusion. There was also overlap between positive engagement trajectory 3, the group with the highest level of positive engagement, and IES intrusion trajectory 2, the group that had lower levels of IES intrusion.

Next the grouping for the positive engagement trajectories were compared to the groupings for the IES avoidance trajectories. The chi-square analysis was significant, χ^2 (6, 178) = 127.63, $p < .001$, suggesting that the trajectories of positive engagement did overlap with the groupings for the IES avoidance trajectories (see Table 16). The greatest overlap occurred between positive engagement trajectory 2, the group that had the lowest levels of positive engagement, and IES avoidance trajectory 3, the group that had the lowest levels of IES avoidance.

The next set of analyses examined the overlap between the groupings for the physical functioning trajectories and the groupings for the positive and negative psychological adjustment trajectories. When comparing the groupings of the FSI trajectories to the groupings of the positive engagement trajectories, the chi-square analysis was significant, χ^2 (2, 114) = 25.60, p < .001, suggesting that there was overlap between the groupings of FSI and positive engagement (see Table 17).

Next comparisons were made between the grouping for FSI and distress. This also resulted in a significant chi-square, χ^2 (3, 114) = 32.23, p < .001, indicating that the there was significant overlap between the groupings for FSI and distress (see Table 18). Next the groupings for the FSI trajectories were compared to the groupings IES intrusion. The chi-square was significant, χ^2 (1, 114) = 17.98, p < .001, suggesting that there was overlap between the groupings of FSI and IES intrusion (see Table 19). The greatest overlap occurred between FSI trajectory 2, the group that had slightly higher levels on the FSI, and IES intrusion trajectory 2, the group that had lower levels of IES intrusion. Lastly, comparisons were made between the grouping of FSI trajectories and the groupings of IES avoidance trajectories. This also resulted in a significant chi-square analysis, χ^2 (3, 114) = 43.83, p < .001, suggesting that there was overlap between the groupings of FSI and IES avoidance (see Table 20).

Control Group

For the control participants, comparisons were made first between the groupings of the negative psychological adjustment variables (distress, IES intrusion, and IES avoidance). When comparing the groupings for distress and IES intrusion the chi-square was significant, χ^2 (6, 197) = 28.82, p < .001, suggesting that the groupings of the distress trajectories overlapped with the groupings for the IES intrusion trajectories (See Table 21). The next comparison was made between the groupings of distress and those of IES avoidance. The chi-square for this comparison was also significant, χ^2 (9, 197) = 136.31, p < .001 (See Table 22). The last comparison was made between the groupings of IES intrusion and those of IES avoidance. This test was also significant, χ^2 (6, 197) = 25.24, p < .001 (See Table 23).

Comparisons were made between the groupings for the positive psychological adjustment variable and the groupings for the negative psychological adjustment variables for the control condition. When comparing the groupings of the positive engagement trajectories to the groupings for distress the chi-square was significant, χ^2 (3, 197) = 134.56, p < .001, suggesting that the groupings of positive engagement trajectories did overlap with the groupings of distress. The results are shown in Table 24, which displays the number of participants in each cell. The greatest overlap occurred for positive engagement trajectory 2, the group that had the lower level of positive engagement, and distress trajectory 4, the group that did not fluctuate in their levels of distress across time. Next, the groupings for the positive engagement trajectories were compared to the groupings for the IES intrusion trajectories. The chi-square analysis was significant, χ^2 (2, 197) = 14.71, p = .001, suggesting that there was significant overlap between the groupings of positive engagement and IES intrusion (see Table 25). The greatest overlap occurred between positive engagement trajectory 2, the group with the lowest level of positive engagement, and IES intrusion trajectory 3, the group with lower levels of IES intrusion. Next, the groupings for the positive engagement trajectories were compared to the groupings for the IES avoidance trajectories. The chi-square analysis was significant, χ^2 (3, 197) = 166.51, p < .001, suggesting that there was overlap (see Table 26). The greatest overlap occurred between, positive engagement trajectory 2, the group that had slightly lower levels of positive engagement, and IES avoidance trajectory 3, the group that started out with lower levels of IES avoidance and decreased over time.

The next set of analyses examined the overlap between the groupings for the physical functioning trajectories and the groupings for the positive and negative psychological adjustment trajectories in the control group. When comparing the groupings of FSI trajectories to the groupings of positive engagement trajectories, the chi-square analysis was significant, χ^2 (1, 118) = 20.58, p < .001, suggesting that there was overlap between these groupings (see Table 27). The greatest overlap occurred between FSI trajectory 2, the group with slightly higher FSI scores, and positive engagement trajectory 1, the group with higher levels of positive engagement. Next, comparisons were made between the groupings of FSI trajectories and the groupings of the trajectories for distress. This also resulted in a significant chi-square, χ^2 (3, 118) = 88.98, p < .001, indicating that there was overlap between the groupings of FSI trajectories and the grouping of distress trajectories (see Table 28). The greatest overlap occurred between FSI trajectory 2, the group with slightly higher levels on the FSI, and distress trajectory 3, the group that started of with moderated distress and decreased over time. Next, the groupings for the FSI trajectories were compared to the groupings for the trajectories of IES intrusion. The chi-square was also significant, χ^2 (2, 118) = 13.55, p = .001 (see Table 29). The most overlap occurred between FSI trajectory 1, the group that had lower scores on the FSI, and IES intrusion trajectory 3, the group that had lower levels of IES intrusion. Lastly, comparisons were made between the groupings of FSI and IES avoidance. This also resulted in a significant chi-square analysis, χ^2 (3, 118) = 31.16, $p < .001$(see Table 30).

CHAPTER 4

DISCUSSION

Breast cancer is a devastating disease that can affect a woman's psychological and physical functioning for many years after she is diagnosed (Helgeson & Tomich, 2005; Epping-Jordan et al., 1999; Badr et al., 2006; Jacobsen et al., 1999). Thus far, research on this topic has focused on identifying how women in general adjust to a diagnosis of breast cancer and its treatment, and what variables influence adjustment. Moreover, early research mainly focused on adjustment at specific time points. More recently researchers have tried to identify different classes of trajectories of functioning in this population. This type of work is in its infancy, however.

This study contributed to that effort. It investigated whether recently diagnosed women being treated for stage 0-III breast cancer had distinct patterns of change in psychological and physical functioning across time. Growth mixture modeling was used to determine whether different trajectories of adjustment emerged in the areas of negative psychological adjustment, positive psychological adjustment and physical adjustment. The results indicated that there are somewhat distinct patterns of change in all these areas of adjustment after a diagnosis of breast cancer.

The trajectory framework that guides this study is useful in looking at longitudinal data where different subgroups are hypothesized. It has long been tacitly assumed that most patients with breast cancer exhibit a similar course of adjustment to their breast cancer diagnosis and treatment. Helgeson and colleagues (2004) were among the first to present data suggesting distinct trajectories of adjustment, and that time alone does not capture all the variance in the course of adjustment in breast cancer patients. Rather, the findings demonstrated that there were subgroups of women who exhibited poorer functioning than other groups. More recently, Donovan and colleagues (2007) have also established that there are subgroups of women with breast cancer who have different patterns or trajectories of fatigue. Donovan's study provides additional support for the position that not all individuals follow the same pattern of adjustment when coping with a breast cancer diagnosis and treatment.

Negative Psychological Adjustment

Negative psychological adjustment is comprised of multiple elements, including a measure of distress, intrusive thoughts, and avoidance of thoughts and stimuli related to breast cancer. Each of these facets of negative psychological adjustment had several distinct trajectories of functioning, lending further credence to the idea that not all patients with a diagnosis of breast cancer have similar courses of adjustment. For most participants in the intervention condition, distress after surgery for breast cancer declined over the course of 12 months. Although distress declined for three of the subgroups, the three had different levels of distress throughout. One group of women started out with lower levels of distress and after participating in the intervention continued to decline even further. Another group of women started off with moderate levels of distress and declined over time but never reached the low levels of distress shown by the least distressed group. Also, there was a group of women who started with the highest levels of distress and decreased over time, but still remained higher than the other groups of women. Finally, there was a small group of women, 9% of the sample, who started at the same levels of initial distress as the other groups, but whose distress increased over time and remained elevated over the 12 months.

The finding that the majority of participants' distress levels declined over time is consistent with the findings of other research in this area (King, Sheil, Hall, & Boyages, 2000; Heim et al., 1997; Irvine et al., 1991; Meyerowitz, 1980). By using a trajectory framework, however, this study was able to identify a small group of women whose distress did not decline over time. These were participants in the intervention group. It would be informative to know why some women who received the intervention did not decline in distress. Predictors were added to the model in order to determine differences between the different groups of women and their overall trajectories.

When predictors were included, the overall trajectories changed slightly, as did the classification rates of participants in each trajectory. This indicates that women's trajectories changed as a function of the predictors added to the model. The only variable that was significant in distinguishing between the distress trajectories among participants in the intervention group was stage. Participants with less-severe staging were more likely to be classified into the group that started out with moderate levels of distress and declined over time. This study was unable to distinguish the characteristics of the group that maintained a high level of distress over the 12 month period. This may reflect the limited number of variables used as predictors. Future studies would benefit from analyzing a wide variety of possible predictors.

Four trajectories of distress were also identified among participants who were assigned to the control group. Two groups showed a slight decline in distress, with the most rapid period of decline occurring from baseline to six months. The other two groups had very different trajectories of functioning from each other and from the first two groups. One group of women started out with high initial levels of distress, decreased rapidly from baseline to 6 months and then increased in distress from 6 months to 12 months, ending with moderate levels of distress. The other group started out with moderate levels of distress, increased from baseline to 6 months and then decreased slightly from 6 months to 12 months. The latter two trajectories indicate that there are subgroups of women whose levels of distress fluctuate quite dramatically over the course of 12 months.

When predictors were included, it was found that the only variables distinguishing between the trajectories were the two subscales of the EAC. Women with lower scores on the expression of feelings subscale were more likely to have the trajectory of moderate distress that declined slightly over time (group 3). Women with higher scores on the examination of feelings subscale were also likely to be classified into this same group of women. These findings may appear to contradict one another. It has been argued in the literature that both examination of feelings and expression of feelings should foster positive outcomes and less distress (Stanton, Kirk, Cameron & Danoff-Burg, 2000). However, not all expression of feelings may be positive and expressed in a "healthy" manner. It is possible that women who express negative feelings or express them in a negative manner may alienate their social support network. One limitation of the measure that was used in this study, the EAC, is that it does not ask women what types of emotions they are expressing and how they are expressing these emotions. This would help to clarify how expression of feelings is truly related to negative psychological adjustment.

Intrusive thoughts related to cancer are very common among patients undergoing surgery and adjuvant treatments and are often related to increased distress (Zakowski et al., 2001; Lepore & Helgeson, 1998; Quartana et al., 2006). The period of medical intervention is extended in this population and can lead to an extended period of intrusive thoughts which can also lead to the experience of other negative emotions (Bleiker, Pouwer, van der Ploeg, Henk, Leer, & Ader, 2000). In this sample, two groups of women in the experimental condition were identified as having distinct trajectories of thought intrusion. Overall, the majority of participants in this sample experienced a gradual decline of intrusive thoughts related to their breast cancer. However, there was a small group of women who started off with higher levels of intrusive thoughts, which stayed stable over time.

Two variables were able to distinguish between the two trajectories of IES intrusion. Women who had fewer years of education were more likely to be classified in the group of women with higher levels of IES intrusion throughout the entire study. The reason for this may be that women with less formal education are less likely to have less adaptive coping resources to deal with stressful events. Also, the subscale examination of feelings was significant in distinguishing between the two trajectories. Women with lower scores on this measure were more likely to be classified in the group of women with higher levels of IES intrusion. This is consistent with evidence of the positive effects of emotional approach coping instead of avoidance of feelings and emotions (Epping-Jordan et al., 1999; Stanton et al., 1994; Stanton et al., 2000).

Three groups were identified for IES intrusion in the control group. Two of the three groups of women (88% of the sample) experienced declines in intrusive thoughts over time. These two groups started with moderate and low levels of intrusive thought, respectively. The most rapid decline occurred from 6 months after surgery to the 12 month time point, similar to what was seen among women in the intervention group. The reason for the rapid decline from 6 months to 12 months might coincide with the offset of medical intervention, which may be associated with decreased frequency of intrusive thoughts related to breast cancer. The third group of women had the highest levels of intrusive thoughts and their trajectory was stable over time, neither decreasing nor increasing substantially.

When predictors were added to differentiate between the trajectories, only examination of feelings was significant. Women who had higher scores on the examination of feelings subscale were more likely to be classified in the group with the lowest levels of IES intrusion. This is consistent with the literature describing the benefits of emotional expression on adjustment to a diagnosis of cancer (Epping-Jordan et al., 1999; Stanton et al., 1994; Stanton et al., 2000).

Another experience that occurs after a diagnosis of breast cancer is that women try to avoid thoughts related to their diagnosis. In this sample, four distinct trajectories were identified for IES avoidance when examining both the experimental condition and the control condition together. Two of the trajectories showed a decrease in avoidance over time, representing 31% of the participants. The other two groups exhibited increased avoidance over time. These two groups also had higher initial levels of avoidance at the start of the study. This may be important information for intervening with this subgroup of women. Women identified as having higher levels of avoidance after diagnosis may be in greater need of an intervention than women with lower levels of avoidance.

When predictors were examined, only the examination of feelings subscale was significant in distinguishing between the trajectories. Women who had lower scores on the examination of feelings subscale were more likely to be classified in the trajectory that had moderate to low levels of avoidance at baseline and stayed stable over time(class 3). This finding is interesting in that one would assume that individuals who had higher levels of IES avoidance would have lower levels of examination of feelings. This predictor might not be a strong indicator of negative psychological adjustment.

Positive Psychological Adjustment

Positive psychological adjustment is rarely addressed in the psycho-oncology literature. This study aimed to enhance the literature for this particular population. This facet of adjustment was assessed using a variable called positive engagement. Among women participating in the intervention, three groups of trajectories were identified. A small group of women, 11% of the sample, had very high levels of positive engagement throughout the course of the study. The majority of the women fell into the group that had moderate levels of positive engagement and increased slightly over time. The third group of women, 15% of the sample, had lower levels of positive engagement initially and gradually increased over time to more moderate to high levels of positive engagement.

Overall, women in the intervention group had moderate to high levels of positive engagement that stayed relatively stable over time. This information is important to know for this population because, although some women who experience a diagnosis of cancer my not exhibit high levels of distress, they also may not exhibit high levels of positive engagement. Women who do not experience high levels of positive engagement may also benefit from an intervention that fosters this type of adjustment.

When predictors were added to distinguish among these three trajectories of positive engagement, only stage turned out to be significant. Women with less severe staging were more likely to be classified into the group that had lower levels of initial positive engagement but developed more positive engagement over time. This may seem counterintuitive; it would seem natural for women with lower stages of cancer to be in the group with the highest levels of positive engagement. However, the actual stage of a woman's breast cancer may not play as an important role as once believed and it might be how women perceives the nature and severity of their disease may actually be of greater importance.

Two groups of trajectories were identified for positive engagement in the control group. These two groups also had similar levels of positive engagement over the course of 12 months. There were no significant predictors of membership in these two groups. Interestingly, when comparing the groups of women in the intervention versus the groups of women in the control group, the intervention group increased in their levels of positive engagement over time whereas the groups of women in the control condition remained relatively stable over time. This indicates that the intervention may foster positive engagement.

Physical Adjustment

Physical adjustment was measured by how much fatigue disrupted a participant's daily life. Two groups of women were identified for physical functioning when both the experimental and control conditions were examined together. These two groups varied greatly in their trajectories of functioning. The majority of participants in the study, 91%, experienced a decrease in how much fatigue disrupted their lives over the course of 18 months. There was also a smaller group of women who started off with higher levels of disruption from fatigue, and their levels of disruption increased over time.

When predictors were examined to distinguish between the trajectories, two variables were significant. One was examination of feelings. Women who had higher levels of examination of feelings were more likely to be in the group that had lower levels of disruption related to fatigue. Also, women who had higher levels of social support were more likely to be in the group that had lower levels of disruption from fatigue. These two findings are consistent with the positive influences that have been associated with both examination of feelings and social support in the literature.

Overlap Between Trajectories of Functioning

Another aim of this study was to determine the extent to which the trajectory groups for negative psychological adjustment overlapped with the groupings for positive psychological adjustment, and the extent to which the groupings for the psychological adjustment trajectories overlapped with groupings on physical functioning. It was originally hypothesized that women who had poor psychological functioning might also have poor physical functioning. Consistent with the findings from Helgeson and colleagues' (2004) study, the current study identified significant overlap between the trajectories of negative psychological adjustment, positive psychological adjustment, and physical adjustment.

An interesting relationship that emerged was the overlap between women's negative psychological functioning and their positive psychological functioning. Women exhibiting lower levels of distress and lower levels of avoidance were more likely to be classified in the group of women that had lower levels of positive engagement. One might assume that individuals that had low levels of distress would naturally be high in positive engagement. However, this appears not to be the case.

It is only relatively recently that the idea has emerged that adjustment to a chronic illness cannot be measured fully by patients' distress, but has be measured by their levels of positive affect as well. The reason for this is because even though patients dealing with a chronic illness may not exhibit high levels of distress or negative affect they might not be exhibiting high levels of positive affect or engagement in their life (Voogt et al., 2005; Helgeson & Tomich, 2005). If positive engagement was not examined in this study, we would have obtained somewhat misleading information about women's adjustment to breast cancer. This was consistent for both the intervention and control groups and is an area that should be examined more closely in future research.

When comparing the psychological adjustment trajectories to the physical functioning trajectories, there was less overlap than originally hypothesized. One reason for this might be because only two trajectories were identified for physical functioning and these two groups of women had similar trajectories after the control variables were added to the model. Another reason for the lack of overlap may be because the variable used to measure physical functioning, the FSI, actually measures disruption to an individual's daily life due to fatigue. This may not be an accurate measure of a person's physical adjustment to cancer and its treatment. Future studies should attempt to use other indicators to measure physical functioning.

Comparison to Previous Studies

Only a few studies have utilized a trajectory framework in analyzing adjustment in breast cancer patients. There are a few reasons for this. First, this type of analysis requires a rather large sample size and the difficulty in recruiting and retaining medical populations has been well established. Helgeson and colleagues were able to successfully accomplish this task and were therefore among the first researchers to examine distinct trajectories of change over time in women with breast cancer. Helgeson et. al. (2004) were able to identify distinct trajectories of change in the areas of mental and physical functioning. Their study found different groups of women, some of whom had improved adjustment and other women whose adjustment to their cancer declined over time in the areas of both mental and physical functioning.

On the other hand, Donovan et al (2007) reported that their study identified distinct trajectories of functioning for women with breast cancer in the domain of fatigue. They identified 2 groups of women, one group with low levels of fatigue that declined over time and a second group with higher levels of fatigue which also declined over time. Upon closer examination, these two groups do not necessarily represent different trajectories of functioning but rather similar trajectories of fatigue with differences in levels of functioning, i.e. how much participants deviate from the mean intercept. Similar findings would have been obtained in that case using latent growth modeling instead of growth mixture modeling.

Using growth mixture modeling, the current study was able to statistically identify different classes of adjustment trajectories among women in the areas of psychological and physical adjustment to breast cancer. One question that arises is how clinically significant are these different classes or groups of women? This is an issue that has not been addressed thus far in the literature, given the early nature of this type of work and the lack of effect size indicators in growth mixture modeling. Therefore, it is extremely important to be cautious when drawing clinical inferences from growth mixture modeling. Thus, although this study was able to statistically identify multiple classes, it is difficult to say with certainty that differences among these classes are clinically significant.

With that caveat in mind, a review of the trajectory profiles was undertaken for distress in the intervention group, IES intrusion overall, IES avoidance overall, positive engagement in the intervention group, and fatigue overall. The goal was to assess the possible clinical significance between the trajectories of the highest functioning group and the lowest functioning group. Perhaps the clearest clinical implications from this research are associated with when change in adjustment occurs. Specifically, clinical change in functioning in this study appeared most consistently at the 3-month assessment period. This time point may be a useful indicator of future functioning and can therefore be utilized to guide treatment planning and intervention.

In the absence of strong clinically significant findings, one might ask how useful this statistical approach is and if researchers incorrectly identify classes, can a “wrong” number of classes still be informative to the current body of literature? The answer to this question is yes, this statistical approach can be valuable, as it allows researchers to conceptualize adjustment in a different and more comprehensive way recognizing that all women may not follow or have the same trajectory of functioning. It can also allow for identification of covariates for the different trajectories that may not have emerged otherwise. Further, it can lead to additional explorations of the clinical significance of class identification through studies of the differential effect of psychosocial treatment for each class.

Influence of Intervention

This study also was able to establish some intervention effects on the outcome variables: distress, intrusion, positive engagement, and physical functioning (as measured by the FACT and FSI). The intervention effects on distress and intrusive thoughts have been documented in other studies from this research group (Antoni et al., 2006a; Antoni et al., 2006b; Antoni et al., 2001). However, this study was unique in that it combined two samples of women who participated in the same intervention over a 10 year span. New intervention effects were discovered in the areas of positive engagement, physical functioning, functional well-being, and fatigue severity. Future research should examine these intervention effects and the factors that might mediate these effects.

Strengths and Limitations

It is important to discuss the general strengths and limitations of this study. As a whole, the sample of breast cancer patients was relatively well-educated, financially stable, predominately non-Hispanic white, and motivated to participate. Generalization of the results of this investigation to other ethnicities, socioeconomic levels, and disease stages should be done with caution. This sample of women was restricted to participants who did not have a significant history of psychopathology and who were psychiatrically stable enough to participate in the current study. Had women who were of lower SES and women who had more severe psychopathology be allowed to participate in the study there might have been a larger percentage of women in the groups with more impaired psychological and physical functioning. Also a very limited number of psychological variables were examined in this study due to different measures being administered in each of the two samples of women. If we had the opportunity to look at other psychosocial variables we may have been able to distinguish between the different trajectories of psychological and physical adjustment.

The present study also provides a cautionary note to researchers who intend to use growth mixture modeling to identify different trajectories of functioning. There are limitations associated with this statistical technique, as well as benefits. First, it is important to start this process with strong empirical support for the possibility of different classes or trajectories. Without this foundation it becomes difficult to justify why a certain number of classes were chosen. Another limitation of this statistical approach is that there is not a standard method for determining the best number of classes. There are conflicting opinions among researchers in the field about the best fit index to use when the multiple fit indices do not converge. A serious issue related to this is the fact that classes are used for interpreting results and drawing conclusions and inferences. Therefore, clinicians using GMM must be careful when deciding on the number of classes and the clinical implications drawn from these analyses. Further research needs to be conducted validating these statistical techniques.

The strengths of this study include combining two samples of breast cancer patients in order to create a large enough sample size for these analyses. Additionally, this study was able to utilize advanced statistical techniques which have only been used limitedly in this population and to identify some of the disadvantages of using growth mixture modeling. The current study contributes to the literature by also examining the positive psychological adjustment of breast cancer patients. Positive psychological adjustment has not been the primary focus of researchers in this area as many studies focus on the negative psychological adjustment of cancer patients. This is an important area to research in order to determine what influences individual's positive adjustment to a chronic illness and therefore helping other women who might have a more negative adjustment.

REFERENCES

Adler, N. E., Horowitz, M., Garcia, A., & Moyer, A. (1998). Additional validation of a scale to assess positive states of mind. *Psychosomatic Medicine, 60 (1),* 26-32.

Alter, C. L., Pelcovitz, D., Axelrod, A., et al. (1996). The identification of PTSD in cancer survivors. *Psychosomatics, 37,* 137-143.

American Cancer Society. (2007). *Cancer facts and figures - 2007*. Atlanta, GA: American Cancer Society.

American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, 4th Edition. Washington D. C., American Psychiatric Association, 1994.

Anderson, B. L. (1992). Psychological interventions for cancer patients to enhance the quality of life. *Journal of Consulting and Clinical Psychology, 60*(4), 552-568.

Andersen, B. L., Kiecolt-Glaser, J. K., & Glaser, R. (1994). A biobehav*ioral model of cancer stress and disease course.* American Psychologist, 49 (5), 389-404.

Andersen, B. L., Farrar, W. B., Golden-Kreutz, D. ,Kutz, L. A., MacCallum, R., Courtney, M. E., & Glaser, R. (1998). Stress and immune responses after surgical treatment for regional breast cancer. *Journal of the National Cancer Institute, 90 (1)*, 30-36.

Andersen, B.L., Farrar, W. B., Golden-Kreutz, D. M., Glaser, R., Emery, C. F., Crespin, T. R., Shapiro, C. L., & Carson III, W. E. (2004). Psychological, behavioral, and immune changes after a psychological intervention: A clinical trial. *Journal of Clinical Oncology, 22 (17)*, 3570-3580.

Andrykowki, M. A., Brady, M. J., & Hunt, J. W. (1993). Positive psychosocial adjustment in potential bone marrow transplant recipients: Cancer as a psychosocial transition. *Psycho-Oncology, 2*, 261-276.

Andrykowski, M. A., Curran, S. L., and Lightner, R. (1998). Off-treatment fatigue in breast cancer survivors: A controlled comparison. *Journal of Behavioral Medicine, 21,* 1–18.

Antoni, M. H., Lehman, J. M., Kilbourn, K. M., Boyers, A. E., Culver, J. L., Alferi, S. M., et al. (2001). Cognitive-behavioral stress management intervention decreases the prevalence of depression and enhances benefit finding among women under treatment for early-stage breast cancer. *Health Psychology, 20,* 20–32.

Antoni, M. H. (2003). *Stress management intervention for women with breast cancer.* Washington, DC: American Psychological Association.

Antoni, M. H., Wimberly, S. R, Lechner. S. C**.,** Kazi**, A**., Sifre, T., Urcuyo, K. R., Phillips, K., Smith, R., Petronis, V., Guellati, S., Wells, K., Blomberg, B., & Carver, C. S. (2006). Stress management intervention reduces cancer-specific thought intrusions and anxiety symptoms among women undergoing treatment for breast cancer. *American Journal of Psychiatry, 163,* 1791-1797.

Antoni, M.H., Lechner, S. C., Kazi, A., Wimberly, S. R., Sifre, T., Urcuyo, K.R., Phillips, K., and Gluck, S. (2006). How stress management improves quality of life after treatment for breast cancer. *Journal of Consulting and Clinical Psychology*, *74 (6)*, 1143-1152.

Badr, H., Basen-Engquist, K., Taylor, C. L. C., & de Moor, C. (2006). Mood states associated with transitory physical symptoms among breast and ovarian cancer survivors. *Journal of Behavioral Medicine, 29 (5)*, 461-475.

Baider, L., & Kaplan De-Nour, A. (1997). Psychological distress and intrusive thoughts in cancer patients. *Journal of Nervous and Mental Disease, 185,* 346–348.

Baker, R., Marcellus, D., Zabora, J., Polland, A., & Jodrey, D. (1997). Psychological distress among adult patients being evaluated for bone marrow transplantation. *Psychosomatics, 38 (1)*, 10-19.

Bower, J. E., Kemeny, M. E., Taylor, S. E., & Fahey, J. L. (1998). Cognitive processing, discovery of meaning, CD 4 decline, and AIDS-related mortality among bereaved HIV-seropositive men. *Journal of Consulting and Clinical Psychology, 66*, 979-986.

Bower, J. E., Ganz, P. A., Desmond, K. A., Bernaards, C., Rowland,J. H., Meyerowitz, B. E., & Berlin, T. R. (2006). Fatigue in long-term breast carcinoma survivors. *Cancer, 106*, 751-758.

Brady, M. J., Cella, D. F., Mo, F. et al. (1997). Reliability and validity of the Functional Assessment of Cancer Therapy-Breast quality-of-life instrument. *Journal of Clinical Oncology, 15,* 974-986.

Broeckel, J. A., Jacobsen, P. B., Horton, J., Balducci, L., & Lyman, G. H. (1998). Characteristics and correlates of fatigue after adjuvant chemotherapy for breast cancer. *Journal of Clinical Oncology, 16*, 1689-1696.

Butler, L. D., Koopman, C., Classen, C., & Spiegel, D. (1999). Traumatic stress, life events, and emotional support in women with metastatic breast cancer: Cancer-related traumatic stress symptoms associated with past and current stressors. *Health Psychology, 18 (6)*, 555-560.

Calhoun, L. G., Cann, A., Tedeschi, R. G., & McMillan, J. (2000). A correlational test of the relationship between posttraumatic growth, religion, and cognitive processing. *Journal of Traumatic Stress, 1*3, 521-527.

Carver, C. S., Smith, R. G., Antoni, M. H., Petronis, V. M., Weiss, S., & Derhagopian, R.P. (2005). Optimistic personality and psychosocial well-being during treatment predicts psychosocial well-being among long-term survivors of breast cancer. *Health Psychology, 24 (5)*, 508-516.

Carver, C. S. & Antoni, M. H. (2004). Finding benefit in breast cancer during the year after diagnosis predicts better adjustment 5 to 8 years after diagnosis. *Health Psychology, 23 (6)*, 595-598.

Carver, C. S., Pozo, C., Harris, S. D., Noriega, V., Scheier, M. F., Robinson, D. S., Ketcham, A. S., Moffat, F. L., Jr., & Clark, K.C. (1993). How coping mediates the effect of optimism on distress: A study of women with early stage breast cancer. *Journal of Personality and Social Psychology, 65*, 375-390.

Cella, D. F., Mahon, S. M. & Donovan, M. (1990). Cancer recurrence as a traumatic event. *Behavioral Medicine, 16,*15–22

Cohen, S., Tyrrell, & Smith, A. P. (1993). Negative life events, perceived stress, negative affect, and susceptibility to the common cold. *Journal of Personality and Social Psychology, 64 (1)*, 131-140.

Cordova, M. J., Andrykowski, M. A., Kenady, D. E., McGrath, P. C., Sloan, D. A., & Redd, W. H. (1995). Frequency and correlates of posttraumatic-stress-disorder-like symptoms after treatment for breast cancer. *Journal of Consulting and Clinical Psychology, 63 (6)*, 981-986.

Cordova, M. J., Cunningham, L. L. C., Carlson, C. R., & Andrykowski, M. A. (2001). Posttraumatic growth following breast cancer: A controlled comparison study. *Health Psychology, 20,* 176–185

Derogatis, L. (1975). The Affects Balance Scale. Riderwood, MD: Clinical Psychometric Research Inc.

Derogatis, L., Abeloff, M. & Melisaratos, N. (1979). Psychological coping mechanisms and survival time in metastatic breast cancer. *Journal of the American Medical Association, 242,* 1504-1508.

Donovan, K. A., Small, B. J., Andrykowski, M. A., Munster, P., & Jacobsen, P. B. (2007). Utility of a cognitive-behavioral model to predict fatigue following breast cancer treatment. *Health Psychology, 26 (4)*, 464-472.

Early Breasts Cancer Trialists' Collaborative Group. (1992). Systemic treatment of early breast cancer by hormonal, cytotoxic, or immune therapy. *Lancet, 339*: 1-15, 71-85.

Epping-Jordan, J. E., Compass, B. E., Osowiecki, D. M., Oppedisano, G., Gerhardt, C., Primo, K., & Krag, D. N. (1999). Psychological adjustment in breast cancer: Processes of emotional distress. *Health Psychology, 18*(4), 315-326.

Fawzy, F. I., Cousins, N., Fawzy, N. W., Kemeny, M. E., Elashoff, R., & Morton, D. (1990). A structured psychiatric intervention for cancer patients, I. Changes over time in methods of coping and affective disturbance. *Archives of General Psychiatry, 47*, 720-725.

Frost, M. H., Suman, V. J., Rummans, T. A., & Dose, A. M. (2000). Physical, psychological and social well-being of women with breast cancer: The influence of disease phase. *Psycho-Oncology, 9*, 221-231.

Ganz, P. A., Kwan, L., Stanton, A. L., Krupnick, J. L., Rowland, J. H., Meyerowtiz, B. E., Bower, J. E., & Belin, T. R. (2004). Quality of life at the end of primary treatment of breast cancer: First results from the moving beyond cancer randomized trial. J*ournal of the National Cancer Institute, 96(5*), 376-387.

Ganz. P. A., Rowland, J. H., Meyerowitz, B. E., & Desmond, K. A. (1998). Impact of different adjuvant therapy strategies on quality of life in breast cancer survivors. *Recent Results in Cancer Research, 152*, 396-411.

Ganz, P. A., Coscarelli, A., Fred, C., Kahn, B., Polinsky, M. L., & Peterson, L. (1996). Breast cancer survivors: psychosocial concerns and quality of life. *Breast Cancer Research and Treatment, 38*, 183-199.

Ganz, P. A., Schag, C. A. C., Lee, J. J., et al. (1992). Breast conservation versus mastectomy: Is there a difference in psychological adjustment or quality of life in the year after surgery? *Cancer, 69*. 1729-1738.

Golden-Kreutz, D. M. & Andersen, B. L. (2004). Depressive symptoms after breast cancer surgery: Relationships with global, cancer-related, and life event stress. *Psycho-Oncology, 13*, 211-220.

Golden-Kreutz, D. M., Thornton, L. M., Wells-Di Gregorio, S., Frierson, G. M., Jim, H. S., Carpenter, K. M., Shelby, R. A., & Andersen, B. L. (2005). Traumatic stress, perceived global stress, and life events: Prospectively predicting quality of life in breast cancer patients. *Health Psychology, 24 (3)*, 288-296.

Grassi, L., Malacarne, P., Maesstir, A., Ramelli, E. (1997). Depression, psychosocial variables and occurrence of life events among patients with cancer. *Journal of Affective Disorders, 44*, 21-30.

Green, B. L., Rowland, J. H., Krupnick, J. L., Epstein, S. A., Stockton, P., Stern, N. M., Spertus, I. L., Steakley, C. (1998). *Psychosomatics, 39*, 102-111.

Hann, D. M., Jacobsen, P., Martin, S., Azzarello, L., & Greenberg, H. (1998). Fatigue and quality of life following radiotherapy for breast cancer: A comparative study. *Journal of Clinical Psychology in Medical Settings, 15 (1)*, 19-33.

Harris, J. R., Lippman, M. E., Veronesi, U., et al. (1992). Breast cancer. *New England Journal of Medicine, 327*, 319-328.

Heim, E., Valach, L., & Schaffner, L. (1997). Coping and psychosocial adaptation: Longitudinal effects over time and stages in breast cancer. *Psychosomatic Medicine, 59,* 408–418.

Helgeson, V. S. & Tomich, P. L. (2005). Surviving cancer: A comparison of 5-year disease-free breast cancer survivors with healthy women. *Psycho-Oncology, 14*, 307-317.

Helgeson, V. S., Snyder, P., & Seltman. (2004). Psychological and physical adjustment to breast cancer over 4 years: Identifying distinct trajectories of change. *Health Psychology, 23 (1)*, 3-15.

Hilton, B. A. (1996). Getting back to normal: the family experience during early stage breast cancer. *Oncology Nursing Forum, 23 (4)*, 605-614.

Holland, J. C. & Rolland, J. H. (1989). Handbook of psychooncology: Psychological care of the patient with cancer. New York, Oxford University Press, 1989.

Horowitz, M. J., Adler, N., & Kegeles, S. (1988). A scale for measuring the occurrence of positive states of mind: a preliminary report. *Psychosomatic Medicine, 50 (5),* 477-483.

Horowitz, M. J., Wilner, N., & Alvarez, N. (1979). Impact of events scale. *Psychosomatic Medicine, 41*, 209-218.

Hughes, K. (1993). Psychosocial and functional status of breast cancer patients: The influence of diagnosis and treatment choice. *Cancer Nursing, 16 (3*), 222-229.

Irvine, N., Brown, B., Crooks, D., Roberts, J., & Browne, G. (1991). Psychosocial adjustment in women with breast cancer. *Cancer, 67,*1097–1117.

Jacobsen, P. B., Hann, D. M., Azzarello, L. M., Horton, J., Balducci, L., & Lyman, G. H. (1999). Fatigue in women receiving adjuvant chemotherapy for breast cancer: Characteristics, course, and correlates. *Journal of Pain and Symptom Management, 18 (4),* 233-242.

Jacobsen, P. B., Widows, M. R., Hann, D. M., Andrykowski, M. A., Kronish, L. E., & Fields, K. K. (1998). Posttraumatic stress disorder symptoms after bone marrow transplantation for breast cancer. *Psychosomatic Medicine, 60 (3)*, 366-371.

Jacobsen, P. B., & Stein, K. (1999). Is fatigue a long-term side effect of breast cancer treatment? Cancer Control, 6, 256-263.

Kaplan, H. S. (1992). A neglected issue: The sexual side effects of current treatments for breast cancer. *Journal of Sex & Marital Therapy, 18*, 3-19.

King, M. T., Shiell, K. A., Hall, J., & Boyages, J. (2000). Quality of life three months and one year after first treatment for early stage breast cancer: Influence of treatment and patient characteristics. *Quality of Life Research, 9,* 789–800.

Kline, R. (2005) Principles and practice of structural equation modeling. 2nd Edition. New York: Guilford Press.

Lazarus, R. S. & Folkman, S. (1984). *Stress, appraisal, and coping.* New York: Springer.

Lepore, S. J., and Helgeson, V. (1998). Social constraints, intrusive thoughts and mental health after prostate cancer. *Journal of Social and Clinical Psychology, 17*, 89–106.

Leucken, L. J. & Compass, B. E. (2002). Stress, Coping, and Immune Function in Breast Cancer. *Annals of Behavioral Medicine, 24 (4),* 336-344.

Levy, Herberman, Lippman, D'Angelo, & Lee. (1991). Immunological and psychosocial predictors of disease recurrence. *Behavioral Medicine, Summer,* 67-75.

Levy, S. M., Lee, J., Bagley, C., & Lippman, M. (1988). Survival hazards analysis in first recurrent breast cancer patients: Seven-year follow-up. *Psychosomatic Medicine, 50,* 520-528.

Lo, Y., Mendell, N., & Rubin, D. (2001). Testing the number of components in a normal mixture. *Biometrika, 88*, 767-778.

Love, S.M. (2000). Dr. Susan Love's breast book (3rd ed.). Cambridge, MA: Perseus Publishing.

Luoma, M. L. & Hakamies-Blomqvist, L. (2004). The meaning of quality of life in patients being treated for advanced breast cancer: A qualitative study. *Psycho-Oncology, 13,* 729-739.

Maunsell, E., Brisson, J., & Deschenes, L. (1992). Psychological distress after initial treatment of breast cancer: Assessment of potential risk factors. *Cancer, 70*, 120-125.

Magnusson, K., Moller, A., Ekman, T., & Wallgren, A. (1999). A qualitative study to explore the experience of fatigue in cancer patients. *European Journal of Cancer Care, 8 (4)*, 224-232.

Meyerowitz, B.E. (1980). Psychosocial correlates of breast cancer and its treatments. *Psychological Bulletin, 87*, 108–131.

Moyer, A., & Salovey, P. (1996). Psychosocial sequelae of breast cancer and its treatment. *Annals of Behavioral Medicine, 18 (2)*, 110-125.

Mundy, E.A., Blanchard, E.B., Cirenza, E., Gargiulo, J., Maloy, B., & Blanchard, C.G. (2000). Posttraumatic stress disorder in breast cancer patients following autologous bone marrow transplantation or conventional cancer treatments. *Behavior Research and Therapy, 38,* 1015-1027.

Muthén, B. (2004). Latent variable analysis: Growth mixture modeling and related techniques for longitudinal data. In D. Kaplan (ed.), Handbook of quantitative methodology for the social sciences (pp. 345-368). Newbury Park, CA: Sage Publications.

Muthén, B. (2003). Statistical and substantive checking in growth mixture modeling: Comment on Bauer and Curran (2003). *Psychological Methods,8,* 369–377.

Muthén, B., & Muthén, L. (2004). *Mplus User's Guide* (v. 3.12). Los Angeles: Muthén & Muthén.

Muthen, L K., & Muthen, B. O. (1998-2006). *Mplus User's Guide. Fourth Edition.* Los Angeles, CA: Muthen & Muthen.

Nylund, K.L., Asparouhov, T., & Muthen, B. (2006). Deciding on the number of classes in latent class analysis and growth mixture modeling. A Monte Carlo simulation study. Accepted for publication in Structural Equation Modeling.

Quartana, P. J., Laubmeier, K. K., & Zakowksi, S. G. (2006). Psychological adjustment following diagnosis and treatment of cancer: An examination of the moderating role of positive and negative emotional expressivity. *Journal of Behavioral Medicine, 29 (5)*, 487-498.

Reynolds, P., Hurley, S., Torres, M., Jackson, J., Boyd, P., & Chen, V. W. (2000). Use of coping strategies and breast cancer survival: Results from the black/white cancer survival study. *American Journal of Epidemiology, 152*, 940-949.

Ryff, C. D. & Singer, B. (1998). The contours of positive human health. *Psychological Inquiry, 9 (1)*. 1-28.

Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods, 7*, 147–177.

Schag, A.C., Ganz, P.A., Polinsky, M.L., Fred, C., Hirji, K., & Petersen, L. (1993). Characteristics of women at risk for psychosocial distress in the year after breast c cancer. *Journal of Clinical Oncology, 11(4)*, 783–793.

Schnoll, R. A., Harlow, L. L., Stolbach, L. L., & Brandt, U. (1998). A structural model of the relationships among stage of disease, age, coping, and psychological adjustment in women with breast cancer. *Psycho-Oncology, 7*, 69-77.

Schover, L. R. (1994). Sexuality and body image in younger women with breast cancer. *Journal of the National Cancer Institute Monographs, 16,* 177-182.

Shapiro, S. L., Lopez, A. M., Schartz, G. E., Bootzin, R., Figuerdo, A. J. (2001). Quality of life and breast cancer: Relationship to psychosocial variables. *Journal of Clinical Psychology, 57 (4)*, 501-519.

Simmons, C. C. (1984). The relationship between life change losses and stress levels for females with cancer. *Oncology Nursing Forum, 11 (2)*, 37-41.

Spiegel, D., Bloom, J. R., & Yalom, I. (1981). Group support for patients with metastatic breast cancer: A randomized outcome study. *Archives of General Psychiatry, 38*, 527-533.

Spiegel, D. (1996). Cancer and depression. *British Journal of Psychiatry, 30*, 109-116.

Spencer, S. M., Lehman, J. M., Wynings, C., Arena, P., Carver, C. S., Antoni, M. H., Derhagopian, R. P, Ironson, G., & Love, N. (1999). Concerns about breast cancer and relations to psychosocial well-being in a multiethnic sample of early-stage patients. *Health Psychology, 18, (2*), 159-168.

Stanton, A. L., Danoff-Burg, S., Sworowski, L. A., Collins, C. A., Branstetter, A. D., Rodriguez-Hanley, A., Kirk, S. B., & Austenfeld, J. L. (2002). Randomized, controlled trial of written emotional expression and benefit-finding in breast cancer patients. *Journal of Clinical Oncology*, *20*, 4160-4168.

Stanton, A. L., Danoff-Burg, S., Cameron, C. L., Bishop, M., Collins, C. A., Kirk, S. B., et al. (2000). Emotionally expressive coping predicts psychological and physical adjustment to breast cancer. *Journal of Consulting and Clinical Psychology, 68*(5), 875-882.

Stanton, A. L., Danoff-Burg, S., Cameron, C. L., & Ellis, A. P. (1994). Coping through emotional approach: problems of conceptualization and confounding. *Journal of Personality and Social Psychology, 66*(2), 350-362.

Stanton, A. L., & Snider, P. R. (1993). Coping with a breast cancer diagnosis: A prospective study. *Health Psychology, 12,* 16–23.

Swanson, G. M. (1992). Breast cancer in the 1990s. *Journal of Sex & Marital Therapy, Journal of the American Medical Women's Association, 47*, 140-148.

Tedeschi, R. G., & Calhoun, L. G. (1996). The posttraumatic growth inventory: Measuring the positive legacy of trauma. *Journal of Traumatic Stress, 9*, 455-471.

Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry, 15,* 1–18.

Tennen, H., & Affleck, G. (2002). Benefit-finding and benefit-reminding. In C. R. Snyder & S. J. Lopez (Eds.)., The handbook of positive psychology (pp. 584-594). New York: Oxford University Press.

Tomich, P. L., & Helgeson, V. S. (2004). Is finding something good in the bad always good? Benefit finding among women with breast cancer. *Health Psychology*, *23*, 16-23.

Theriault, R. L., & Sellin, R. V. (1994). Estrogen-replacement therapy in younger women with breast cancer. *Journal of the National Cancer Institute Monographs, 16*, 149-152.

Trijsburg, R. W., van Knippenberg, F. C. E., & Rijpma, S. E. (1992). Effects of psychological treatment on cancer patients: a critical review. *Psychosomatic Medicine, 54*, 489-517.

Tripathy, D., Dollinger, M., Rosenbaum, E. H., Rugo, H., Benz, C., Goodson, W. H., Ezkenazi, L., Ljung, B. M., Sickles, E. A., Margolis, L. W., Meyler, T. S., Park, J., Crawford, B., & Henderson, C. (2002). Breast. In Dollinger, Rosenbaum, Tempero & Mulvihill (Eds.) Everyone's Guide to Cancer Therapy (pp. 424-460). Kansas, KA: Andrews McMeel Publishing.

van der Pompe, G., Antoni, M., Visser, A., & Garssen, B. (1996). Adjustment to breast cancer: the psychobiological effects of psychosocial interventions. *Patient Education and Counseling, 28*, 209-219.

Vinokur, A.D., Threatt, B.A., Vinokur-Kaplan, D., & Satariano,W.A. (1990). The process of recovery from breast cancer for younger and older patients: changes during the first year. *Cancer, 65*, 1252–1254.

Voogt, E., Van Der Heide, A., Van Leeuwen, A. F., Visser, A. P., Cleiren, M. P. H. D., Passchier, J., & Van Der Maas, P. J. (2005). Positive and negative affect after diagnosis of advanced cancer. *Psycho-Oncology, 14*, 262-273.

Watson, M., Greer, S., Rowden, L., Gorman, C., Robertson, B., Bliss, J. M., & Tunmore, R. (1991). Relationships between emotional control, adjustment to cancer and depression and anxiety in breast cancer patients. *Psychological Medicine, 21*, 51-57.

Williamson, G. M. (2000). Extending the activity restriction model of depressed affect: Evidence from a sample of breast cancer patients. *Health Psychology, 19,* 339–347.

World Health Organization. (1948). World Health Organization constitution. In Basic documents. Geneva.

Yang, C. (2006). Evaluating latent class analyses in qualitative phenotype identification. *Computational Statistics & Data Analysis, 50*, 1090–1104.

Yurek, D., Farrar, W., & Anderson, B. L. (2000). Breast cancer surgery: comparing surgical groups and determining individual differences in postoperative sexuality and body change stress. *Journal of Consulting and Clinical Psychology, 68*(4), 697-709.

Zakowski, S. G., Valdimarsdottir, H. B., and Bovbjerg, D. H. (2001). Emotional expressivity and intrusive cognitions in women with family histories of breast cancer: Application of a cognitive processing model. *Br. J. Health Psychology,* 6, 151–165.

APPENDIX A TABLES

Table 1

Description of Demographic Variables by Sample

Variable	Sample 1 (N=136)	Sample 2 (N= 240)
Age (years)	50.3 (9.15)	50.3 (9.03)
Education (years)	15.6 (4.78)	15.6 (2.38)
Ethnic Background		
African American/ Black-Other	9%	8%
White, Non-Hispanic	73%	67%
Hispanic	18%	25%
Employment Status		
Employed	79%	74%
Not Employed	21%	26%
Relationship Status**		
Partnered	73%	63%
Not Partnered	27%	37%
Menopausal Status		
Pre-Menopausal	47%	45%
Peri/Post-Menopausal	53%	55%

Note. ** significant differences between groups at p =.04.

Table 2

<u>Description of Disease and Treatment Variables by Sample</u>

Variable	Sample 1 (N=136)	Sample 2 (N=240)
Stage		
0	12%	16%
I	47%	38%
II	41%	38%
III	---	8%
Nodal Involvement		
0	72%	64%
1	13%	13%
2	3%	6%
3 or more	12%	17%
Procedure		
Mastectomy	54%	49%
Lumpectomy	46%	51%
Radiation*		
No	57%	39%
Yes	43%	61%
Chemotherapy*		
No	58%	43%
Yes	42%	57%
Tamoxifen*		
No	52%	30%
Yes	48%	70%
Reconstructive Surgery		
No	67%	65%
Yes	33%	35%

**significant difference between groups at. p<..01.*

Table 3

Determining the Number of Classes for Distress Based on Fit Indices – Intervention Group – All observations

	1 Class	2 Classes	3 Classes	4 Classes**	5 Classes
AIC	781.91	768.01	766.38	759.19	760.928
BIC	820.10	815.74	823.65	826.01	837.29
Sample Adjusted BIC	782.09	768.24	766.64	759.50	761.29
Entropy		.919	.728	.765	.714
Lo, Mendell, Rubin		2 vs. 1 p = .025	3 vs. 2 p = .421	4 vs. 3 p = .032	5 vs. 4 p = .810
N for each class	178	Class 1 = 7 Class 2 = 171	Class 1 = 20 Class 2 = 82 Class 3 = 76	Class 1 = 15 Class 2 = 86 Class 3 = 71 Class 4 = 6	Class 1 = 43 Class 2 = 49 Class 3 = 15 Class 4 = 64 Class 5 = 7

Table 4

Determining the Number of Classes for Distress Based on Fit Indices – Control Group – All Observations

	1 Class	2 Classes	3 Classes	4 Classes**	5 Classes
AIC	1041.78	1035.91	1025.64	1024.76	1025.14
BIC	1081.18	1085.16	1084.73	1093.71	1103.94
Sample Adjusted BIC	1043.16	1037.64	1027.71	1027.18	1027.91
Entropy		.804	.681	.682	.742
Lo, Mendell, Rubin		2 vs. 1 p = .372	3 vs. 2 p = .715	4 vs. 3 p = .166	5 vs. 4 p = .555
N for each class	197	Class 1 = 183 Class 2 = 14	Class 1 = 65 Class 2 = 15 Class 3 = 117	Class 1 = 8 Class 2 = 28 Class 3 = 40 Class 4 = 121	Class 1 = 6 Class 2 = 21 Class 3 = 71 Class 4 = 26 Class 5 = 73

Table 5

Determining the Number of Classes for IES Intrusion Based on Fit Indices – Intervention Group

	1 Class	2 Classes**	3 Classes	4 Classes	5 Classes
AIC	1396.06	1372.49	1367.92	1355.83	1354.22
BIC	1434.25	1420.21	1425.19	1422.65	1430.58
Sample Adjusted BIC	1396.24	1372.71	1368.19	1356.14	1354.57
Entropy		.816	.666	.735	.729
Lo, Mendell, Rubin		2 vs. 1 p = .011	3 vs. 2 p = .481	4 vs. 3 p = .105	5 vs. 4 p = .378
N for each class	178	Class 1 = 21 Class 2 = 157	Class 1 = 97 Class 2 = 21 Class 3 = 60	Class 1 = 47 Class 2 = 85 Class 3 = 9 Class 4 = 37	Class 1 = 34 Class 2 = 83 Class 3 = 18 Class 4 = 34 Class 5 = 9

Table 6

Determining the Number of Classes for IES Intrusion Based on Fit Indices – Control Group

	1 Class	2 Classes	3 Classes**	4 Classes	5 Classes
AIC	1589.20	1559.79	1540.22	1551.77	1548.49
BIC	1538.45	1618.89	1609.16	1630.57	1637.14
Sample Adjusted BIC	1590.93	1561.87	1542.64	1554.54	1551.60
Entropy		.732	.794	.687	.726
Lo, Mendell, Rubin		2 vs. 1 p = .325	3 vs. 2 p = .069	4 vs. 3 p = .926	5 vs. 4 p = .878
N for each class	197	Class 1 = 69 Class 2 = 128	Class 1 = 112 Class 2 = 18 Class 3 = 67	Class 1 = 13 Class 2 = 53 Class 3 = 102 Class 4 = 29	Class 1 = 35 Class 2 = 1 Class 3 = 49 Class 4 = 99 Class 5 = 13

Table 7

Determining the Number of Classes for IES Avoidance Based on Fit Indices

	1 Class	2 Classes	3 Classes	4 Classes**	5 Classes
AIC	2695.67	2657.56	2648.57	2625.61	2629.09
BIC	2750.65	2724.32	2727.11	2715.93	2731.19
Sample Adj BIC	2706.23	2670.38	2663.65	2642.95	2648.70
Entropy		.712	.722	.757	.720
Lo, Mendell, Rubin		2 vs. 1 p = .002	3 vs. 2 p = .536	4 vs. 3 p = .087	5 vs. 3 p = .451
N for each class	375	Class 1 = 54 Class 2 = 321	Class 1 = 272 Class 2 = 12 Class 3 = 91	Class 1 = 241 Class 2 = 34 Class 3 = 92 Class 4 = 8	Class 1 = 206 Class 2 = 20 Class 3 = 24 Class 4 = 24 Class 5 = 101

Table 8

Determining the Number of Classes for Positive Engagement Based on Fit Indices – Intervention Group – All Observations

	1 Class	2 Classes	3 Classes**	4 Classes	5 Classes
AIC	1080.27	1078.35	1078.68	1080.33	Not Identified
BIC	1121.71	1129.35	1139.24	1150.45	
Sample Adjusted BIC	1080.54	1078.68	1079.07	1080.78	
Entropy		.761	.769	.610	
Lo, Mendell, Rubin		2 vs. 1 p = .429	3 vs. 2 p = .234	4 vs. 3 p = .510	
N for each class	179	Class 1 = 20 Class 2 = 159	Class 1 = 25 Class 2 = 138 Class 3 = 16	Class 1 = 8 Class 2 = 21 Class 3 = 45 Class 4 = 105	

Table 9

<u>Determining the Number of Classes for Positive Engagement Based on Fit Indices – Control Group – All Observations</u>

	1 Class	2 Classes**	3 Classes	4 Classes	5 Classes
AIC	1157.14	1158.97	1160.51	1162.27	1161.47
BIC	1189.98	1201.65	1213.05	1224.65	1233.71
Sample Adjusted BIC	1158.30	1160.47	1162.36	1164.45	1164.01
Entropy		.418	.497	.689	.751
Lo, Mendell, Rubin		2 vs. 1 p =.316	3 vs. 2 p = .487	4 vs. 3 p = .696	5 vs. 4 p = .460
N for each class	197	Class 1 = 86 Class 2 = 111	Class 1 = 93 Class 2 = 37 Class 3 = 67	Class 1 = 35 Class 2 = 81 Class 3 = 68 Class 4 = 13	Class 1 = 60 Class 2 = 28 Class 3 = 36 Class 4 = 68 Class 5 = 5

Table 10

Determining the Number of Classes for Physical Adjustment (Fatigue - Disruption) Based on Fit Indices

	1 Class	2 Classes**	3 Classes	4 Classes	5 Classes
AIC	3080.13	3055.03	3056.02	3043.33	3049.33
BIC	3145.62	3130.86	3142.19	3139.84	3156.18
Sample Adjusted BIC	3085.40	3061.13	3062.95	3051.09	3057.92
Entropy		.851	.829	.463	.453
Lo, Mendell, Rubin		2 vs. 1 p = .30	3 vs. 2 p = .27	4 vs. 3 p = .33	5 vs. 4 p = .33
N for each class	232	Class 1 = 216 Class 2 = 16	Class 1 = 208 Class 2 = 17 Class 3 = 7	Class 1 = 44 Class 2 = 176 Class 3 = 0 Class 4 = 12	Class 1 = 12 Class 2 = 173 Class 3 = 0 Class 4 = 0 Class 5 = 47

Table 11

Overlap Between Distress and IES Intrusion Trajectories in the Intervention Group

	Distress Trajectories				
IES Intrusion Trajectories	1	2	3	4	Total
1	4	63	0	9	76
2	37	6	51	8	102
Total	41	69	51	17	178

Table 12

Overlap Between Distress and Avoidance Trajectories in the Intervention Group

	Distress Trajectories				
IES Avoidance Trajectories	1	2	3	4	Total
1	14	1	19	1	35
2	19	1	28	2	50
3	3	55	2	11	71
4	5	12	2	3	22
Total	41	69	51	17	178

Table 13

Overlap Between IES Avoidance and IES Intrusion Trajectories in the Intervention Group

	IES Avoidance Trajectories				
IES Intrusion Trajectories	1	2	3	4	Total
1	0	0	58	18	76
2	35	50	13	4	102
Total	35	50	71	22	178

Table 14

Overlap Between Distress and Positive Engagement Trajectories in the Intervention Group

	Distress Trajectories				
Positive Engagement Trajectories	1	2	3	4	Total
1	22	1	7	0	30
2	7	64	0	8	79
3	12	4	44	9	69
Total	41	69	51	17	178

Table 15

Overlap Between IES Intrusion and Positive Engagement Trajectories in the Intervention Group

	IES Intrusion Trajectories		
Positive Engagement Trajectories	1	2	Total
1	0	30	30
2	74	5	79
3	2	67	69
Total	76	102	178

Table 16

Overlap Between IES Avoidance and Positive Engagement Trajectories in the Intervention Group

	IES Avoidance Trajectories				
Positive Engagement Trajectories	1	2	3	4	Total
1	14	15	1	3	30
2	1	0	59	19	79
3	20	35	11	3	69
Total	35	50	71	22	178

Table 17

Overlap Between FSI and Positive Engagement Trajectories in the Intervention Group

	Positive Engagement Trajectories			
FSI Trajectories	1	2	3	Total
1	8	20	32	60
2	21	0	33	54
Total	29	20	65	114

Table 18

Overlap Between Distress and FSI Trajectories in the Intervention Group

	Distress Trajectories				
FSI Trajectories	1	2	3	4	Total
1	17	15	16	12	60
2	24	0	30	0	54
Total	41	15	46	12	114

Table 19

Overlap Between IES Intrusion and FSI Trajectories in the Intervention Group

	IES Intrusion Trajectories		
FSI Trajectories	1	2	Total
1	17	43	60
2	0	54	54
Total	17	97	114

Table 20

Overlap Between IES Avoidance and FSI Trajectories in the Intervention Group

	IES Avoidance				
FSI Trajectories	1	2	3	4	Total
1	10	16	23	11	60
2	24	30	0	0	54
Total	34	46	23	11	114

Table 21

Overlap Between Distress and IES Intrusion Trajectories in the Control Group

	Distress Trajectories				
IES Intrusion Trajectories	1	2	3	4	Total
1	0	20	28	34	82
2	1	17	3	2	23
3	1	22	33	36	92
Total	2	59	64	72	197

Table 22

Overlap Between Distress and Avoidance Trajectories in the Control Group

	Distress Trajectories				
IES Avoidance Trajectories	1	2	3	4	Total
1	1	33	12	0	46
2	1	25	19	0	45
3	0	0	24	62	86
4	0	1	9	10	20
Total	2	59	64	72	197

Table 23

Overlap Between IES Intrusion and Avoidance Trajectories in the Control Group

	IES Intrusion Trajectories			
IES Avoidance Trajectories	1	2	3	Total
1	23	12	11	46
2	8	8	29	45
3	35	2	49	86
4	16	1	3	20
Total	82	23	64	197

Table 24

Overlap Between Distress and Positive Engagement Trajectories in the Control Group

	Distress Trajectories				
Positive Engagement Trajectories	1	2	3	4	Total
1	2	59	37	0	98
2	0	0	27	72	99
Total	2	59	64	72	197

Table 25

Overlap Between IES Intrusion and Positive Engagement Trajectories in the Control Group

	IES Intrusion Trajectories			
Positive Engagement Trajectories	1	2	3	Total
1	35	20	43	98
2	47	3	49	99
Total	82	23	92	197

Table 26

Overlap Between IES Avoidance and Positive Engagement Trajectories in the Control Group

	IES Avoidance Trajectories				
Positive Engagement Trajectories	1	2	3	4	Total
1	46	44	3	5	98
2	0	1	83	15	99
Total	46	45	86	20	197

Table 27

Overlap Between FSI and Positive Engagement Trajectories in the Control Group

	Positive Engagement Trajectories		
FSI Trajectories	1	2	Total
1	45	22	67
2	51	0	51
Total	96	22	118

Table 28

Overlap Between FSI and Distress Trajectories in the Control Group

	Distress Trajectories				
FSI Trajectories	1	2	3	4	Total
1	0	8	58	1	67
2	2	49	0	0	51
Total	2	57	58	1	118

Table 29

Overlap Between FSI and IES Intrusion Trajectories in the Control Group

	IES Intrusion Trajectories			
FSI Trajectories	1	2	3	Total
1	27	4	36	67
2	17	16	18	51
Total	44	20	54	118

Table 30

Overlap Between FSI and IES Avoidance Trajectories in the Control Group

	IES Avoidance				
FSI Trajectories	1	2	3	4	Total
1	16	22	20	9	67
2	29	22	0	0	51
Total	45	44	20	9	118

APPENDIX B FIGURES

Figure 1a. Four trajectories of mental functioning from 4 to 55 months after breast cancer diagnosis. MCS = Mental Health Component Score; T = time post diagnosis. *From:* Helgeson et al.: *Health Psychology*, Volume 23(1), January 2004, 3–15.

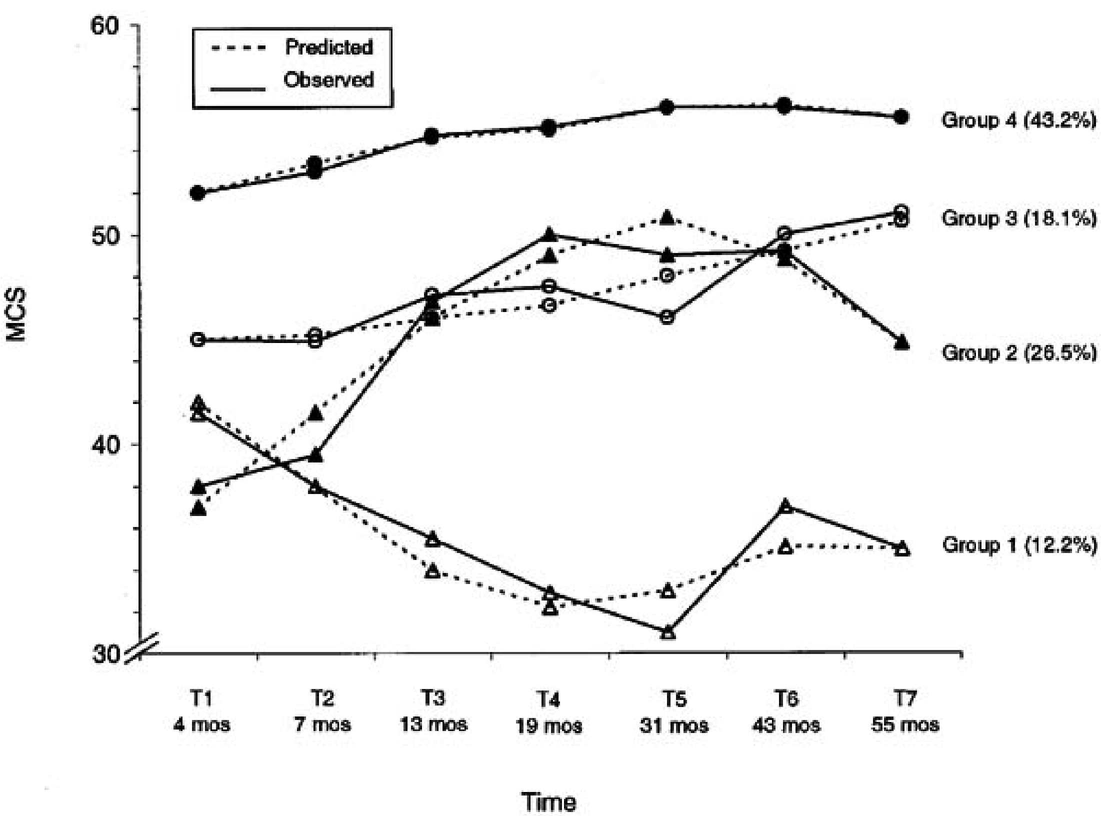

Figure 1b. Four trajectories of physical functioning from 4 to 55 months after breast cancer diagnosis. PCS = Physical Health Component Score; T = time post diagnosis. *From:* Helgeson et al.: Health Psychology, Volume 23(1), January 2004, 3–15

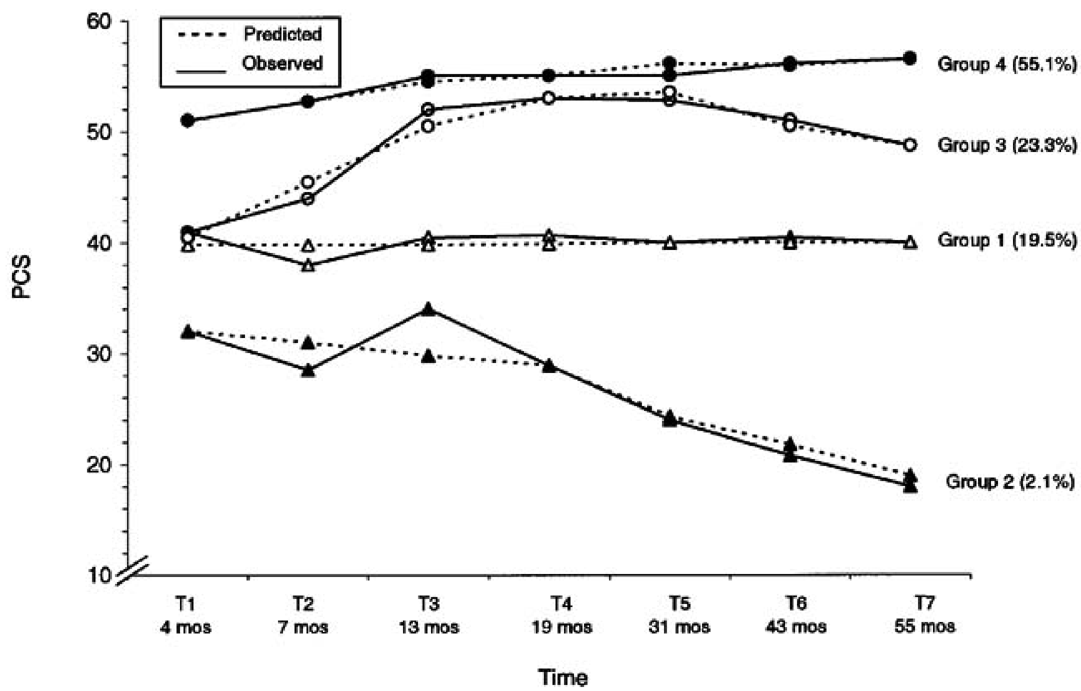

Figure 2. An Unconditional Model of Growth Mixture Modeling.

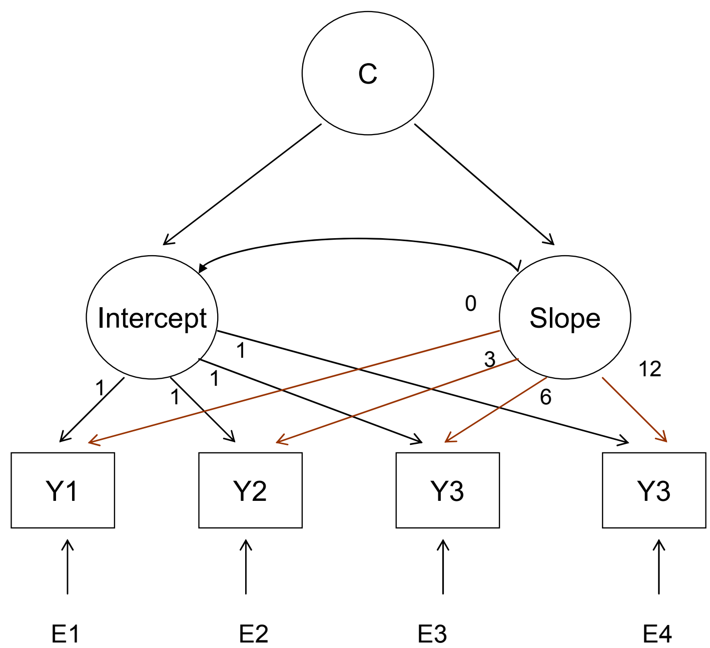

Figure 3. A Conditional Model of Growth Mixture Modeling.

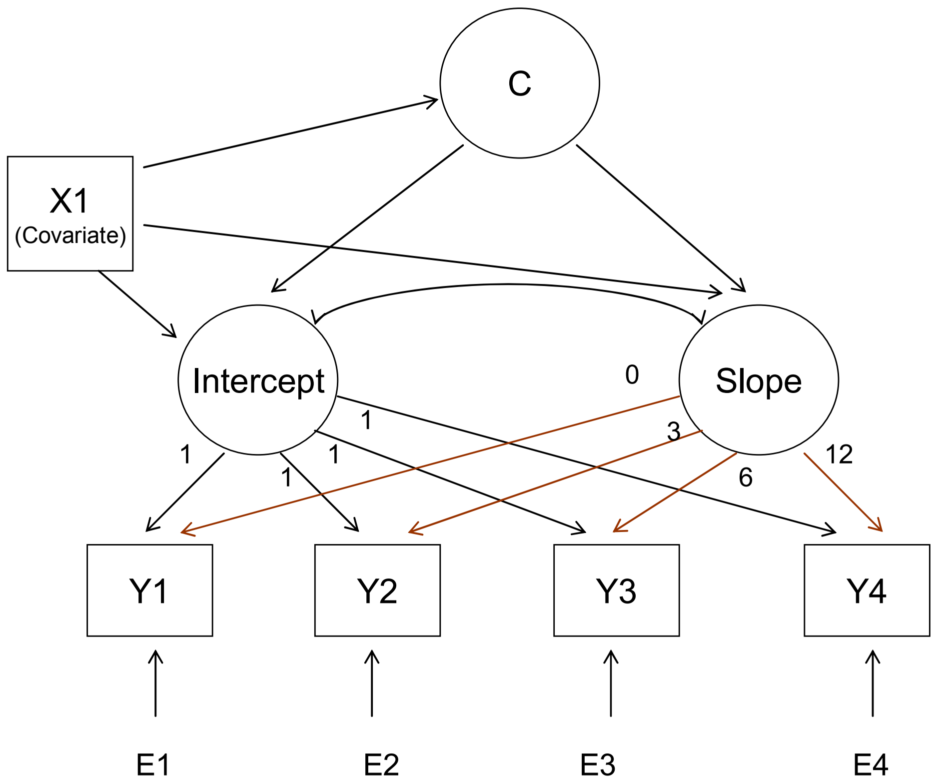

Figure 4a. Estimated Class Trajectories for Distress, Intervention Group

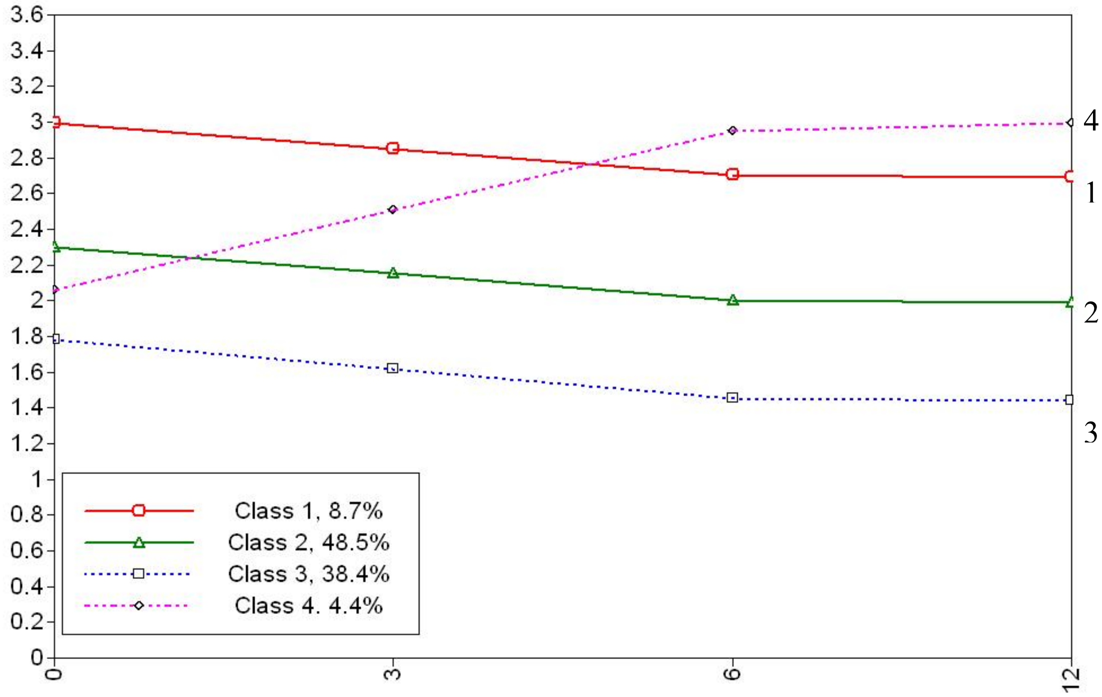

Figure 4b. Estimated Class Trajectories for Distress, Intervention Group with Predictors Influencing the Categorical Latent Variable

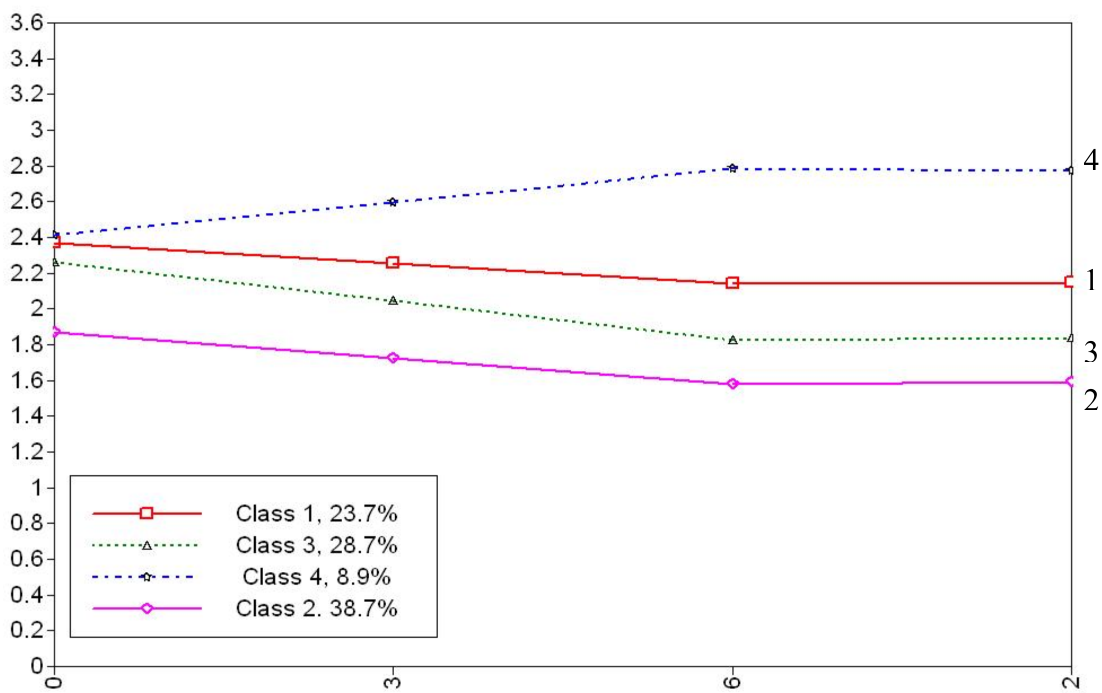

Figure 5a. Estimated Class Trajectories for Distress – Control Group.

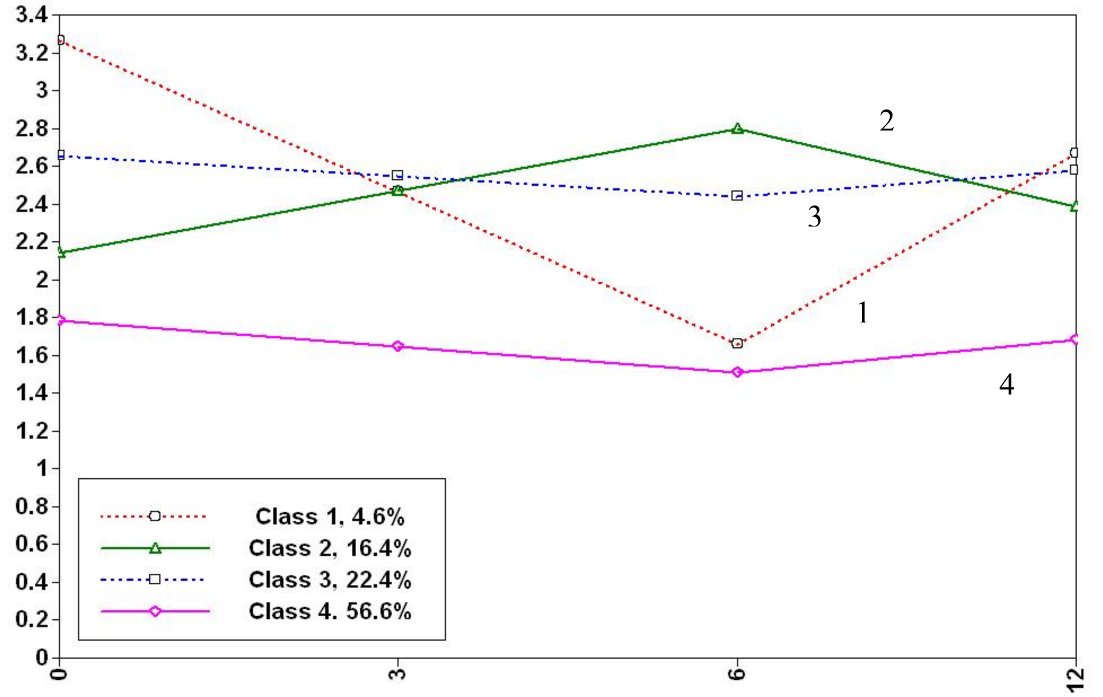

Figure 5b. Estimated Class Trajectories for Distress – Control Group with Predictors Influencing the Categorical Latent Variable

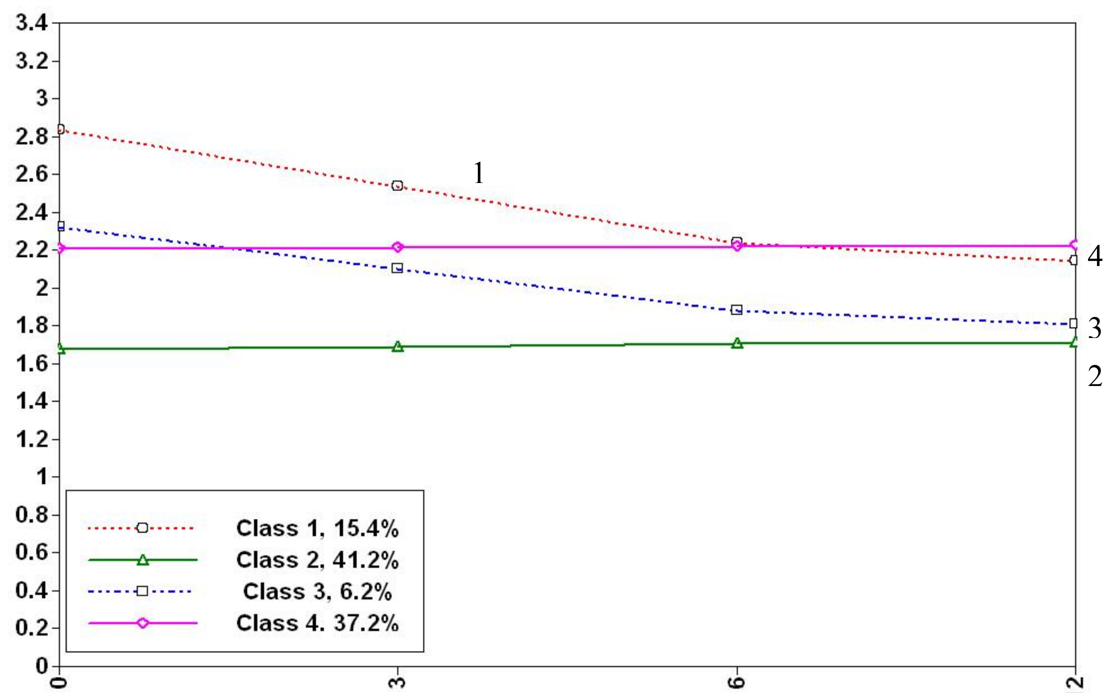

Figure 6a. Estimated Class Trajectories for IES Intrusion – Intervention Group.

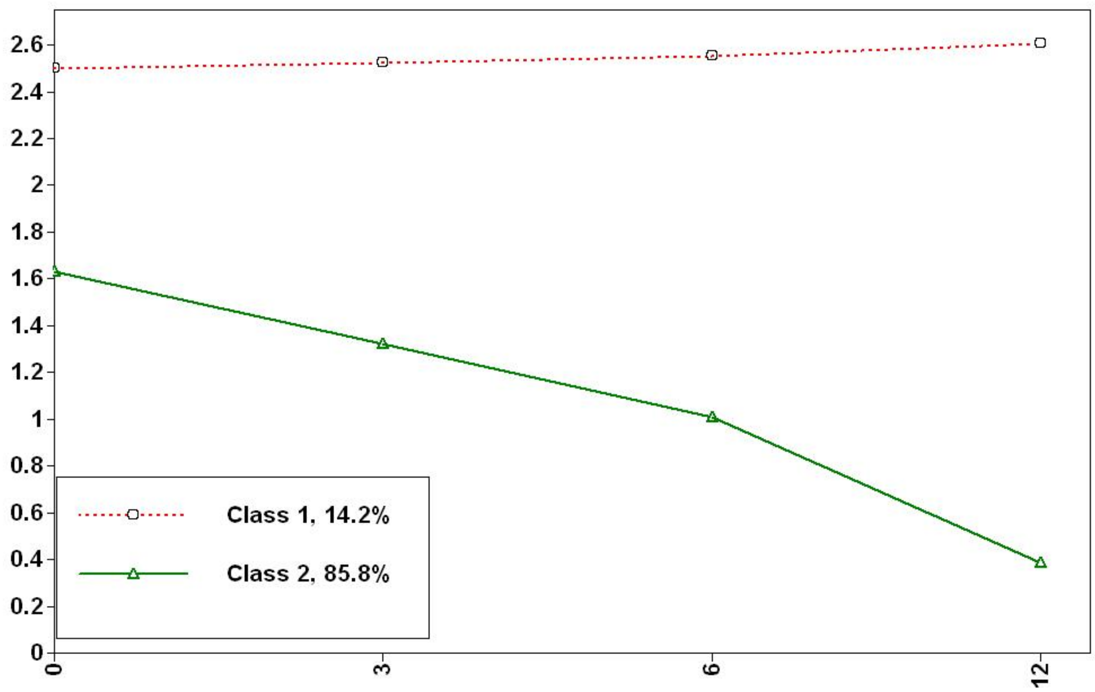

Figure 6b. Estimated Class Trajectories for IES Intrusion – Intervention Group with Predictors Influencing the Categorical Latent Variable

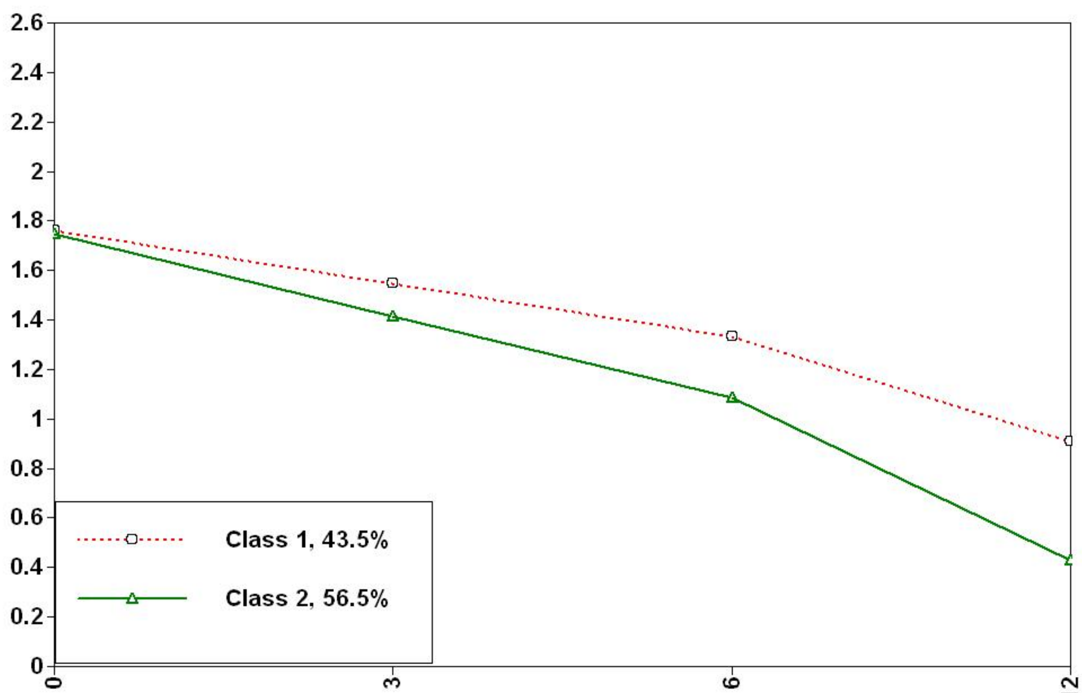

Figure 7a. Estimated Class Trajectories for IES Intrusion – Control Group.

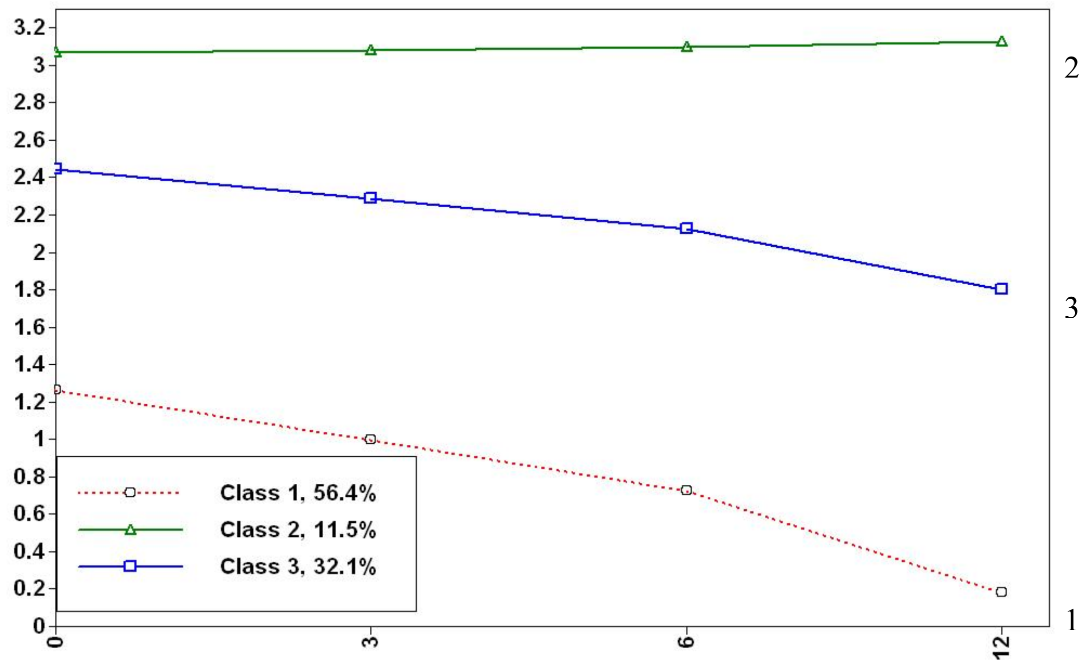

Figure 7b. Estimated Class Trajectories for IES Intrusion – Control Group with Predictors Influencing the Categorical Latent Variable

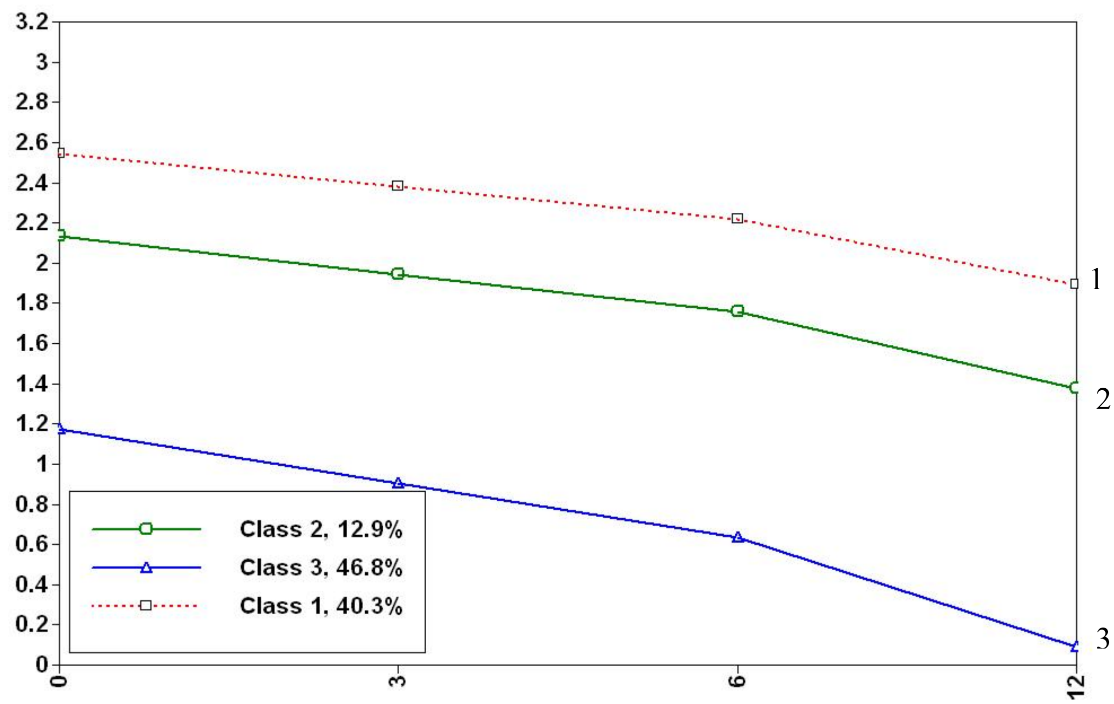

Figure 8a. Estimated Class Trajectories for IES Avoidance.

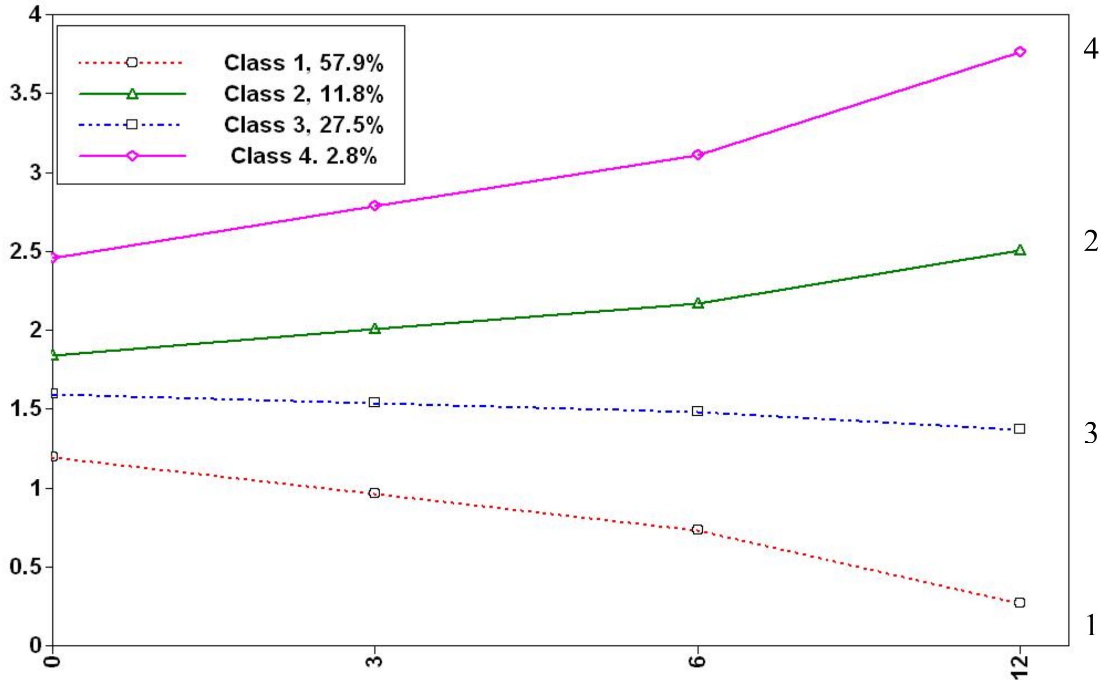

Figure 8b. Estimated Class Trajectories for IES Avoidance with Predictors Influencing the Categorical Latent Variable.

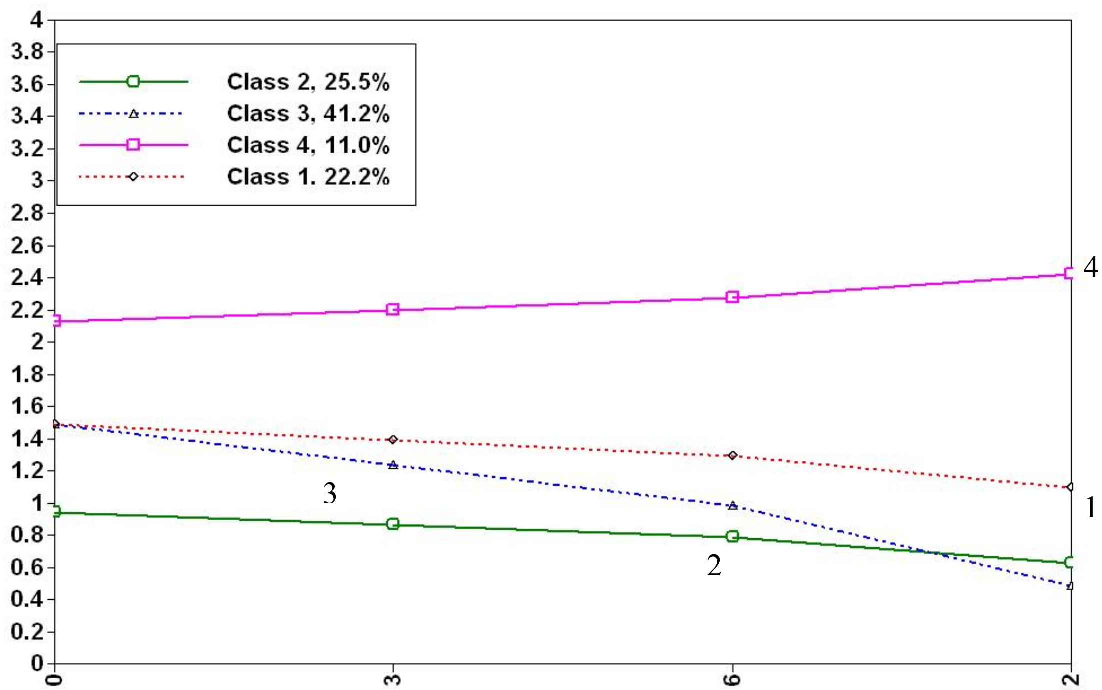

Figure 9a. Estimated Class Trajectories for Positive Engagement – Intervention Group.

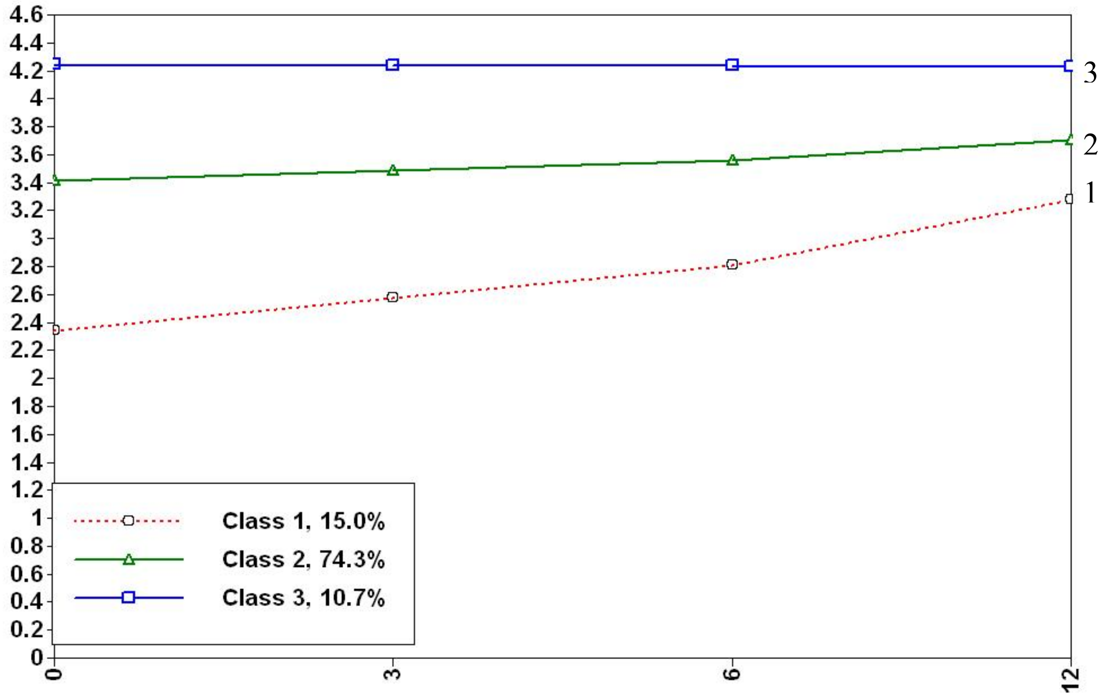

Figure 9b. Estimated Class Trajectories for Positive Engagement – Intervention Group with Predictors Influencing the Categorical Latent Variable.

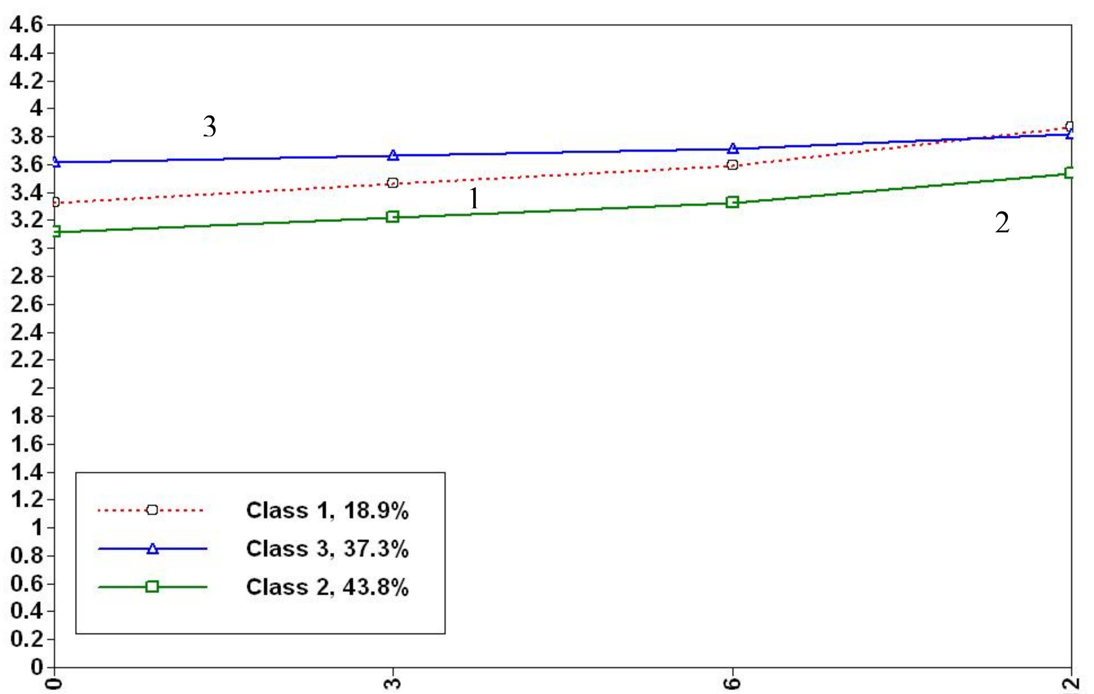

Figure 10a. Estimated Class Trajectories for Positive Engagement – Control Group.

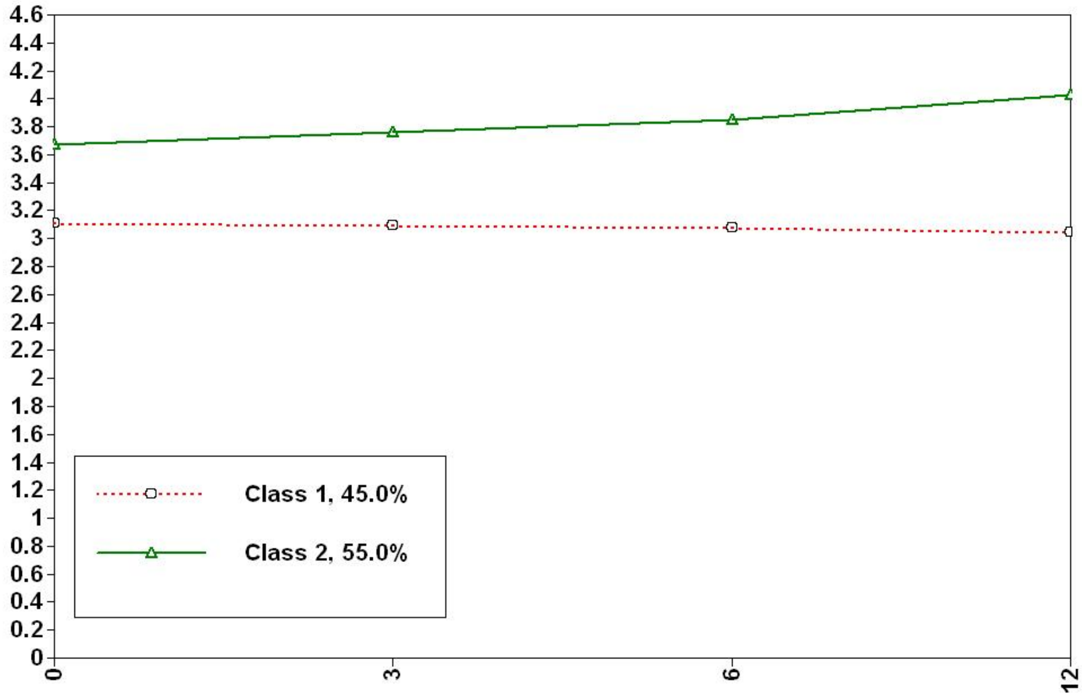

Figure 10b. Estimated Class Trajectories for Positive Engagement – Control Group with Predictors Influencing the Categorical Latent Variable.

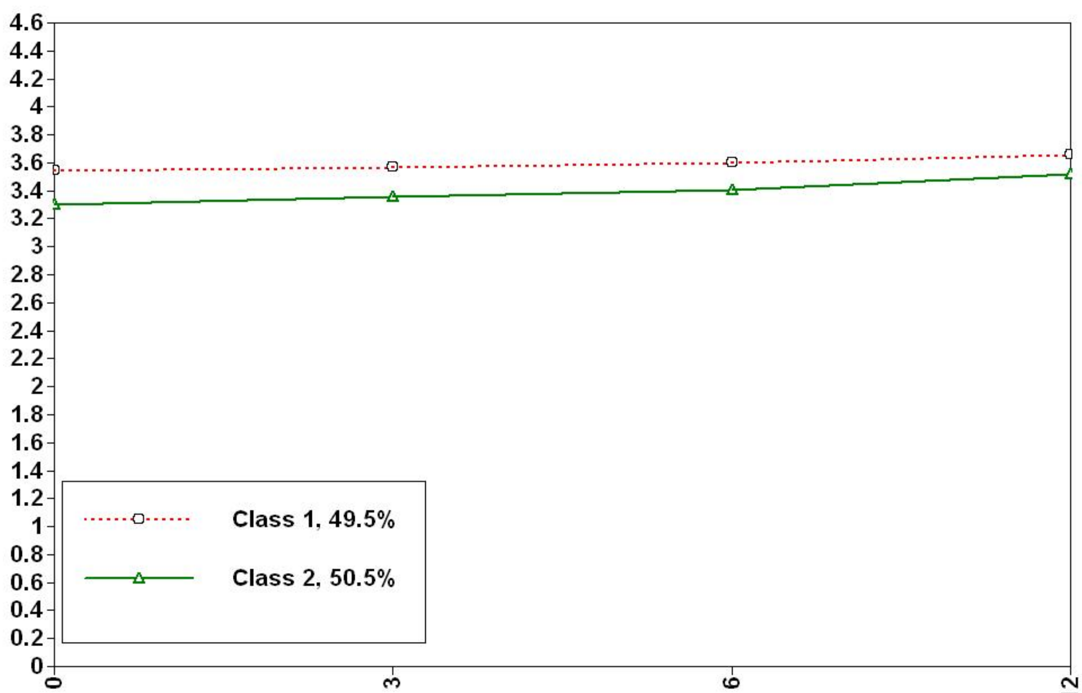

Figure 11a. Estimated Class Trajectories for Fatigue - Disruption

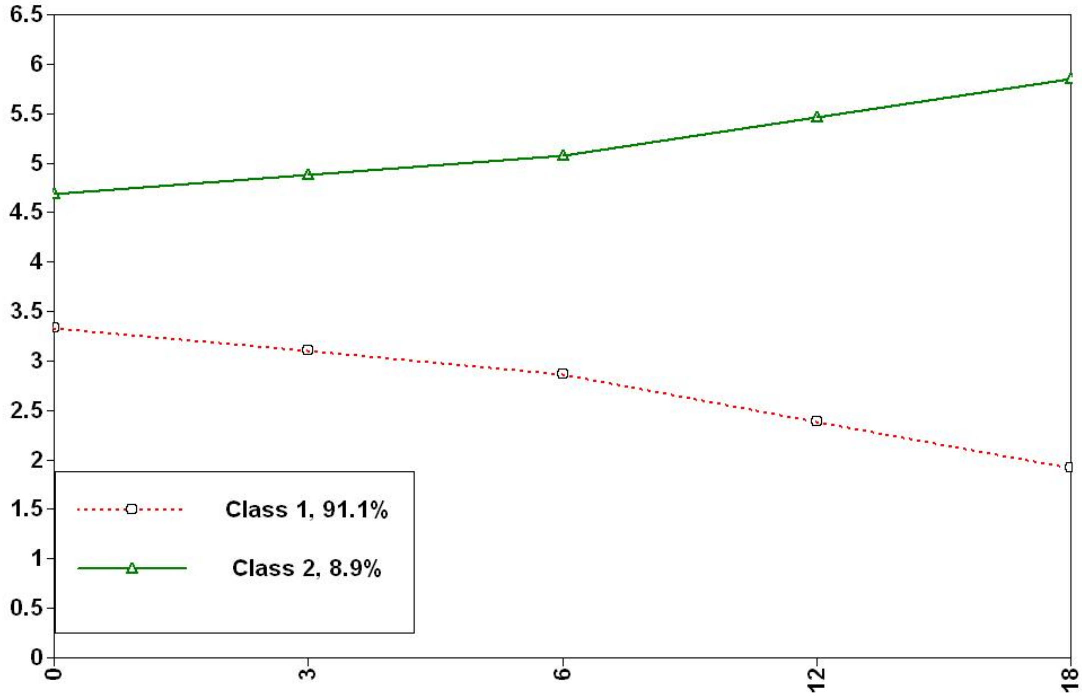

Figure 11b. Estimated Class Trajectories for Fatigue – Disruption with Predictors Influencing the Categorical Latent Variable