AN ABSTRACT OF THE DISSERTATION OF

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Title: A Bioecological Model of Grief Recovery: Theory and Test of the Model

Abstract approved:

________________________________________
Samuel Vuchinich

A primary aim of bereavement research is to alleviate suffering and promote well-being at the junction of life and death for the survivor in an attachment relationship. Bereavement research in the last decade has focused primarily on examining grief recovery within the context of intrapersonal processes. This emphasis has often ignored peer, family, and cultural influences on adjustment to loss. As a result, targeted grief interventions have largely been limited to adaptive and maladaptive factors within the individual. Evidence from recent research suggests the importance of taking into account contextual factors within the social environment that have bidirectional influences on the individual, and function as potential deficits or resources for grief recovery over time. Thus, a comprehensive framework for the simultaneous consideration of person-environment transactions, rather than just a strict emphasis on intrapersonal processes, is essential to advancing the current understanding of grief recovery. To address this gap, this study presents a bioecological model of grief recovery with the addition of a ‘loss system’ level of
influence—capturing characteristics of the deceased, circumstances of the death, and the relationship between the bereaved and the deceased prior to the death—to simultaneously account for the person- and environment-level systems of influence. The implications of this theoretical model are described for two different types of loss: death of spouse in older adults and death of a child.

To move this model from theory to real-world application, the viability of the model was tested by empirically contrasting it with an individual-level (intrapersonal) model of grief recovery as applied to spousal bereavement in later life. An archived longitudinal data set (the Changing Lives of Older Couples data) was the basis for growth curve models examining the trajectory of grief several years after death of spouse. The individual-level model focused on the intrapersonal predictors known to influence grief recovery, while the bioecological model included the same intrapersonal predictors as well as loss system predictors. In sum, the analyses provided evidence that having relatively high levels of death acceptance and religiosity prior to the death of a spouse is associated with improved psychological health in the early stages of widowhood. Although the bioecological growth curve model did not evidence a better fit than the individual model in this study, it remains a useful framework accounting for a broader range of influences, with the loss system as a key to advancing bereavement research. Moreover, psychological adjustment to the death of a loved one is merely one type of life event that can be understood using this model of grief recovery.

Although the theoretical and empirical models presented here represent only a limited approximation of the more complex phenomena of a human reaction when a spouse dies, it provides a new, more comprehensive framework for understanding grief and how it
changes over time. Perhaps its greatest utility lies in its theoretical conceptualization of a loss system, and how that loss system can be tested using growth curve statistical models as described in Manuscript 2. This novel approach holds great promise for bereavement researchers. In addition, Manuscript 1 showed how researchers can adapt this framework to model different types of loss experiences, particularly those with strong parallels to the death of a loved one, such as relationship dissolution and divorce. Similarly, this model could be applied empirically to loss experiences such as progressive illness, disability, infertility, and disaster. Variables included in the bioecological systems should be modified accordingly to reflect and allow measurement of the type of loss, life circumstances, culture, and context of the population under study.
A Bioecological Model of Grief Recovery: Theory and Test of the Model

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Daniel L. Romo

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I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to any reader upon request.

Daniel L. Romo, Author
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GENERAL INTRODUCTION

Humans have the innate capacity and drive to seek out and form intimate relations with others, whether it be the attachment of a one-year-old to a mother or the enduring love of a couple married for 40 years. Such relationships are a central focus of human lives. The human response to losing such bonds can manifest in both positive and negative ways. As Neimeyer (2011) states, “Indeed, the tragedy (and opportunity) of the human condition is that we are wired for attachment in a world of impermanence . . .” (p. xiii). Thus, in the journey through life, attachment bonds of varying intensity are inevitably formed with people, animals, and even places or possessions (Bowlby, 1980). Once formed, a constellation of emotional reactions occur when these bonds are broken.

The aging United States population (Federal Interagency Forum on Aging-Related Statistics, 2010) has led to increased interest in older adults’ responses to stressful life events, particularly the death of a spouse (Bisconti, Bergeman, & Boker, 2006; Bonanno et al., 2002; Hansson & Stroebe, 2007; Monroe, 2008). This experience has been linked with numerous health outcomes and quality of life in older adults, including morbidity and mortality (McEwen, 2002; Moon, Kondo, Glymour, & Subramanian, 2011). Although bereavement research progressed significantly throughout the 20th century, recent decades have marked a major transition in theoretical approaches, resulting in the emergence of postmodern grief theories (e.g., Rubin, 1999; Stroebe & Schut, 1999). These contemporary models of coping with grief and loss have afforded a new and more scientifically-grounded portrait of the grieving process. Despite these advances, however, an emphasis remains on intrapersonal (within person) processes that influence adaptation, such as death attitudes.
and physical health (see, for example, Caplan & Schooler, 2003; Neimeyer, 2008), with much less focus on the significance of the context and circumstances of the grief experience (Center for the Advancement of Health, 2004; Valentine, 2006). As a result, the focus of grief interventions has largely been limited to intrapersonal deficits and resources leading to positive or pathological outcomes. This concentrated focus on the individual overlooks the central role of person-context transactions (e.g., Breen & O’Connor, 2007; Sandler, Wolchik, & Ayers, 2008; Valentine, 2006) in adaptation to interpersonal loss.

Despite continuing advances in science and medicine, shifting marital trends, and an increase in the average life expectancy, spousal bereavement remains a hallmark of late life. Of individuals 65 years of age or older, 28.1% are widowed, increasing to 59.6% for those 85 and older (U.S. Census Bureau, 2010). Widowhood disproportionately affects women: of individuals 65-74 years of age, only 6.4% of the men are widowed, compared to 24.0% of women (U.S. Census Bureau, 2010).

A key illustration of the importance of studying the correlates of grief trajectories can be observed in the widowed population, as the death of a spouse is a normative experience for individuals in the second half of life. Moreover, a substantial body of evidence indicates that widowhood is associated with an increase in illness, disease, and death for surviving spouses (McEwen, 2002; Mineau, Smith, & Bean, 2002; Moon, Kondo, Glymour, & Subramanian, 2011; Stroebe, Hansson, Stroebe, & Schut, 2001); thus, a better understanding of the factors that mitigate or exacerbate its physical and mental health consequences is needed. This Introduction links the following concepts that provide the basis for the research presented in this dissertation: grief, bereavement reaction, resilient
adjustment, widowhood, contemporary bereavement research, research aims, methodology.

**Grief**

Grief is the psychological response to loss (Taylor, 2006). A typical grief reaction includes feelings of emptiness, an inability to concentrate, and a host of adverse physical symptoms such as nausea, lowered immunity, weight loss or gain, aches, pains, and insomnia (Stroebe & Stroebe, 1987). The deep sense of yearning that often dominates grief subsequent to loss may be the central psychological feature distinguishing grief from other stress processes (Bonanno, 2009). However, the general physiological stress response to bereavement is not distinct from the response to other stressful life events (e.g., stress of job loss, divorce) (O'Connor, 2012). Thus, grief is essentially a stress reaction, and like any stress reaction, it is not a constant or fixed state.

Grief can elicit intense negative emotions that lead to negative consequences for the bereaved, such as suicide and substance abuse (Rosenzweig, Prigerson, Miller, & Raynolds, 1997). Kastenbaum's (1977) research has shown that grief comes in waves rather than in sequential stages. Recently other researchers have advanced a more differentiated oscillation concept: the dual-process model of coping with bereavement (Stroebe & Schut, 1999) proposes that when we cope with loss effectively, we oscillate between loss and restoration processes. The former process deals with aspects of the loss, whereas the latter sets aside the loss to focus on the demands of everyday life without the deceased, and what needs to be done to reestablish normative functioning. Thus, grief is experienced in cycles, where brief shifts from painful, negative emotions give way to positive emotions that afford the bereaved a chance to reconnect with those around them. A key to this new line of
thinking is that grieving involves a predictable oscillation as individuals attend to emotional
and functional integration of the loss.

**Bereavement Reaction**

Bereavement is defined as “the state or condition caused by loss through death” (Cavanaugh & Blanchard-Fields, 2011, p. 513); grief is viewed as the feelings and reactions experienced after a loss. It is the intrapersonal response to bereavement (Stroebe & Stroebe, 1987). Bereavement reactions and their length are not standardized; however, it is generally accepted that they can have physical, psychological, cognitive, emotional, behavioral, and spiritual components (Dent, 2005), and that it is a multidimensional, individualized process (Hooymen & Kramer, 2006). Contemporary theorists acknowledge bereavement reactions as dynamic processes, exploring different contextual variables that can influence grief, such as concurrent stressors and social factors (e.g., Rubin, 1999), and emphasizing the importance of continuing bonds with the deceased as part of the grief process (see, for example, Klass, Silverman, & Nickman, 1996).

**Resilient Adjustment**

Coifman, Bonanno, and Rafaeli (2007) characterize resilience to loss as when individuals experience “an initial brief spike in distress or may temporarily struggle to maintain self-regulatory equilibrium . . . they nonetheless still seem to continue functioning effectively at or near their normal levels” (p. 376). Resilient individuals tend to have a number of resources in their favor, such as better social and financial support, physical health, education, and fewer ongoing life stressors (Bonanno & Kaltman, 1999). Additionally, individuals who cope well after loss tend to have a greater sense of self-efficacy, demonstrated by confidence, an optimistic view that they will get through the
struggle, and a belief that they have the capacity to exercise agency in difficult circumstances (Westphal, Bonanno, & Bartone, 2008).

Although such resilience seems to occur for most, about 10-15% of bereaved individuals struggle with prolonged bereavement reactions (longer period of acute grief response compared to peers) (Bonanno & Kaltman, 2001). These reactions are characterized by maladaptive processes such as rumination, difficulties with concentration and attention, intermittent sleeplessness, and problems cultivating social support, that continue to interfere with daily functioning for several years or more after a loved one's death (Bisconti, Bergeman, & Boker, 2006). Prolonged or chronic grieving, delayed grief responses, and the absence of grief symptoms (Bonanno et al., 2002) represent three distinct paths, illustrating that the duration and presence of grief varies dramatically among the bereaved (Wortman & Silver, 1989).

**Contemporary Bereavement Research**

Contemporary bereavement research in the last decade has focused primarily on examining grief recovery within the context of intrapersonal processes such as death attitudes, patterns of attachment, and expressive flexibility of emotions (Coifman & Bonanno, 2009; Fraley & Bonanno, 2004; Neimeyer, 2008). However, this emphasis on intrapersonal factors has often ignored peer, family, and cultural influences on adjustment to loss (Sandler, Wolchik, & Ayers, 2008). As a result, targeted grief interventions have largely been limited to adaptive and maladaptive factors within the individual (Kristjanson, Lobb, Aoun, & Monterosso, 2006). To overcome this limitation and to better understand the developmental processes of grief recovery, it is important that bereavement research expand beyond individual-level influences. Evidence from recent research suggests the
importance of taking into account contextual factors within the environment that have bidirectional influences on the individual, and function as potential deficits or resources for grief recovery over time (Breen & O'Connor, 2007). One theoretical framework that takes into account such environmental levels of influence is Bronfenbrenner's (1979, 1986, 2001) bioecological model (see also Bronfenbrenner & Morris, 1998, 2006). To address this gap in bereavement research, a bioecological model of grief recovery is presented in manuscript 1. It provides a new conceptual framework for understanding the effects of bereavement, and suggests some guidelines for therapeutic intervention at the individual, family, community, and societal levels.

Applying this theory leads to the acknowledgement of a loss system as an essential element of a bioecological model of grief recovery. This new loss system incorporates a fundamental component missing from other contemporary models of bereavement—an interactive system that takes into account characteristics of the deceased, circumstances of the death, and characteristics of the relationship between the bereaved and the deceased prior to the death. Moreover, it opens bereavement research to consider more than just the psychological characteristics of the bereaved individual, providing a new way to conceptualize the differentiated oscillation concept described above by including both intrapersonal and environmental processes. In addition, the loss system may also improve the understanding of the variability in the three distinct paths of grief (prolonged or chronic grieving, delayed grief responses, and the absence of grief symptoms) described above, providing a better explanation for why bereavement reactions are so negatively valenced for some individuals, but less severe for others.

Research Aims
This dissertation has two aims:

Aim 1: To present a bioecological model of grief recovery with the addition of an interactive ‘loss system’—capturing characteristics of the deceased, circumstances of the death, and the relationship between the bereaved and the deceased prior to the death—to simultaneously account for the person- and environment-level systems of influence.

Aim 2: To test the viability of the bioecological model of grief recovery by empirically contrasting it with an individual-level model of grief recovery as applied to spousal bereavement in later life. The individual-level model focuses on the intrapersonal predictors known to influence grief recovery, while the bioecological model includes the same intrapersonal predictors as well as loss system predictors related to the circumstances surrounding the loss. The analysis tests whether a growth curve model that includes the loss system provides a significantly better fit to the data than a model without it.

These aims are addressed in two studies presented as two manuscripts. Together, these two studies advance the field by allowing researchers to model grief trajectories using a conceptually distinct systems model conceived for the express purpose of examining grief recovery. With a greater capacity to capture key components missing from other contemporary models of bereavement, this adaptation will ultimately enhance the understanding of the relationship within and between bidirectional levels of influence on adaptation to interpersonal loss.

Methodology

The aim of manuscript 2 of this dissertation is to understand change in grief throughout the bereavement reaction, and at what rate this change may be occurring, to better understand variability in grief trajectories. Measuring such change in grief over time
requires the use of multiwave data, enabling application of latent-variable models to the measurement of grief. Manuscript 2 uses longitudinal data from the Changing Lives of Older Couples Study (CLOC) (University of Michigan, n.d.). As the aim of this study is to examine a transactional model of grief, including the individual, sociocultural, and contextual influences on the grief process over time, a series of grief models are tested using latent growth curve (LGC) analysis. Growth curve models examine longitudinal observations of a measure of individuals in terms of an intercept that represents the initial level of the variable at Wave 1, and the slope over time change in individuals per one unit of time (Hox, 2010). They further allow estimates of the effects of covariates on the intercept and slope. Thus, data were analyzed in Mplus Version 7.2 (Muthén & Muthén, 1998–2013) using a latent growth curve (LGC) model. The models in manuscript 2 include a baseline model with no independent variables or covariates; an individual-level model with two independent variables for intrapersonal influences; and a fully specified bioecological model with two independent variables for loss system and three covariates for micro, macro, and chrono systems, as well as the intrapersonal influences variables in the individual-level model.

A LGC analysis of the individual-level model of grief recovery was done, exploring the relationship between the hypothesized predictor variables of this model—death acceptance and physical health—and grief at 6, 18, and 48 months post-loss. This model tested whether 1) higher levels of death acceptance and physical health pre-loss are associated with less initial grief at wave 1, and 2) higher levels of death acceptance and physical health pre-loss are associated with the rate of change in grief following the spouses’ deaths.
A LGC analysis of the bioecological model of grief recovery was also done, exploring the relationship between the hypothesized predictor variables of this model—death acceptance, physical health, death forewarning, and marital quality—and grief, at 6, 18, and 48 months post-loss. Religious involvement, socioeconomic status, and time gap were included as covariates. This model tested whether 1) higher levels of the stated predictor variables are associated with less grief at wave 1, and 2) higher levels of these predictors are associated with the rate of change in grief following the spouses’ deaths.
Manuscript 1

A Bioecological Model of Grief Recovery
ABSTRACT

The purpose of this article is to introduce a new model of grief recovery that integrates individual- and environmental-levels of influence within a bioecological framework. Labeled the bioecological model of grief recovery, this model incorporates a new loss system accounting for characteristics of the deceased, circumstances of the death, and characteristics of the relationship between the bereaved and the deceased prior to the death. Conceptual issues are discussed in relation to this model, and two types of loss experiences (death of child and death of spouse in late life) are reviewed as illustrative examples of the bidirectional relationship across levels of influence on adaptation to loss, highlighting the importance of the loss system as a key to advancing bereavement research. It is argued that this conceptually distinct bioecological model, conceived for the express purpose of examining grief recovery, is a superior framework for researchers to apply in modeling grief trajectories—ultimately contributing to a more integrative, comprehensive understanding of grief recovery and its importance to transformational development over the lifespan. Recommendations for future research are provided.
A Bioecological Model of Grief Recovery

Contemporary bereavement research in the last decade has focused primarily on examining grief recovery within the context of intrapersonal processes such as death attitudes, patterns of attachment, and expressive flexibility of emotions (Coifman & Bonanno, 2009; Fraley & Bonanno, 2004; Neimeyer, 2008). However, this emphasis on intrapersonal factors has often ignored peer, family, and cultural influences on adjustment to loss (Sandler, Wolchik, & Ayers, 2008). As a result, targeted grief interventions have largely been limited to adaptive and maladaptive factors within the individual (Kristjanson, Lobb, Aoun, & Monterosso, 2006). To overcome this limitation and to better understand the developmental processes of grief recovery, it is important that bereavement research expand beyond individual-level influences. Evidence from recent research suggests the importance of taking into account contextual factors within the environment that have bidirectional influences on the individual, and function as potential deficits or resources for grief recovery over time (Breen & O’Connor, 2007). One theoretical framework that takes into account such environmental levels of influence is Bronfenbrenner’s (1979, 1986, 2001) bioecological model (see also Bronfenbrenner & Morris, 1998, 2006). To address this gap in bereavement research, a bioecological model of grief recovery is presented. It provides a new conceptual framework for understanding the effects of bereavement, and suggests some guidelines for therapeutic intervention at the individual, family, community, and societal levels.

Applying this theory leads to the acknowledgement of a loss system as an essential element of a bioecological model of grief recovery. This paper integrates prior research and provides illustrative examples of the loss system influence on two types of loss experiences known to result in pronounced grief in the survivors—death of a child and death of a spouse.
in late life. This new loss system incorporates a fundamental component missing from other contemporary models of bereavement—an interactive system that takes into account characteristics of the deceased, circumstances of the death, and characteristics of the relationship between the bereaved and the deceased prior to the death. Moreover, it opens bereavement research to consider more than just the psychological characteristics of the bereaved individual.

The next two sections review recent progress in the understanding of bereavement, highlighting the nature of grief, its dynamic characteristics, contemporary bereavement theory, and post-loss resilient adjustment. A rationale is then provided for a contextual framework accounting for individual- and environmental-level risk and protective factors influencing adaptation to loss, leading to the presentation of the bioecological model of grief recovery.

Grief

Humans have the innate capacity and drive to seek out and form intimate relations with others, whether it be the attachment of a one-year-old to a mother or the enduring love of a couple who has been married for 40 years. Such relationships are a central focus of human lives. The human response to losing such bonds can manifest in both positive and negative ways, and these responses are not necessarily mutually exclusive. As Neimeyer (2011) states, “Indeed, the tragedy (and opportunity) of the human condition is that we are wired for attachment in a world of impermanence . . .” (p. xiii). Thus, in the journey through life, attachment bonds of varying intensity are inevitably formed with people, animals, and even places or possessions (Bowlby, 1980). Once formed, a constellation of emotional reactions occur when these bonds are broken.
Grief is the psychological response to loss (Taylor, 2006). A typical grief reaction includes feelings of emptiness, an inability to concentrate, and a host of adverse physical symptoms such as nausea, lowered immunity, weight loss or gain, aches and pains, and insomnia (Stroebe & Stroebe, 1987). The deep sense of yearning that often dominates grief subsequent to loss may be the central psychological feature distinguishing grief from other stress processes (Bonanno, 2009). However, the general physiological stress response to bereavement is not distinct from the response to other stressful life events (e.g., stress of job loss, divorce) (O'Connor, 2012). Thus, grief is essentially a stress reaction, and like any stress reaction, it is not a constant or fixed state.

Grief can elicit intense negative emotions that lead to negative consequences for the bereaved, such as suicide and substance abuse (Rosenzweig, Prigerson, Miller, & Raynolds, 1997). Kastenbaum’s (1977) research has shown that grief comes in waves rather than in sequential stages. Recently other researchers have advanced a more differentiated oscillation concept: the dual-process model of coping with bereavement (Stroebe & Schut, 1999) proposes that when we cope with loss effectively, we oscillate between loss and restoration processes. The former process deals with aspects of the loss, whereas the latter sets aside the loss to focus on the demands of everyday life without the deceased, and what needs to be done to reestablish normative functioning. Thus, grief is experienced in cycles, where brief shifts from painful, negative emotions give way to positive emotions that afford the bereaved a chance to reconnect with those around them. A key to this new line of thinking is that grieving involves a predictable oscillation as individuals attend to emotional and functional integration of the loss. The loss system described here provides a new way to conceptualize this oscillation because it includes both intrapersonal and environmental
processes. A benefit of this improved conceptualization will be advancing the understanding of resilience to loss.

**Resilient Adjustment**

Coifman, Bonanno, and Rafaeli (2007) characterize resilience to loss as when individuals experience “an initial brief spike in distress or may temporarily struggle to maintain self-regulatory equilibrium . . . they nonetheless still seem to continue functioning effectively at or near their normal levels” (p. 376). Resilient individuals tend to have a number of resources in their favor, such as better social and financial support, physical health, education, and fewer ongoing life stressors (Bonanno & Kaltman, 1999). Additionally, individuals who cope well after loss tend to have a greater sense of self-efficacy, demonstrated by confidence, an optimistic view that they will get through the struggle, and a belief that they have the capacity to exercise agency in difficult circumstances (Westphal, Bonanno, & Bartone, 2008).

Although such resilience seems to occur for most, about 10-15% of bereaved individuals struggle with prolonged grief reactions, longer period of acute grief response compared to peers (Bonanno & Kaltman, 2001). These reactions are characterized by maladaptive processes such as rumination, difficulties with concentration and attention, intermittent sleeplessness, and problems cultivating social support, that continue to interfere with daily functioning for several years or more after a loved one’s death (Bisconti, Bergeman, & Boker, 2006). Prolonged or chronic grieving, delayed grief responses, and the absence of grief symptoms (Bonanno et al., 2002) represent three distinct paths, illustrating that the duration and presence of grief varies dramatically among the bereaved (Wortman & Silver, 1989). The loss system may improve the understanding of
this variability, providing a better explanation for why bereavement reactions are so negatively valenced for some individuals, but less severe for others.

Research on grief recovery has emphasized the intrapersonal experience of grief as though it occurs in personal isolation, including increasingly refined descriptions of personal risk factors, symptoms, and trajectories (Neimeyer & Hogan, 2001). This work has not provided sufficient attention to the influence of the context within which the grief experience unfolds (Center for the Advancement of Health, 2004; Valentine, 2006). To address this gap, a theoretical framework is needed that will take into account these overlooked contextual influences on grief recovery in contemporary research. Bronfenbrenner’s (1979, 1986, 2001) bioecological model provides a way to include the intrapersonal, as well as the social and contextual, variables that contribute to the adaptation to loss. In the following sections, we describe how the loss system is a natural part of the bioecological model and how applying it leads to new ways of understanding grief recovery.

Bioecological Model

Bronfenbrenner’s (1986, 2001) bioecological model, as well as more recent versions (e.g., Bronfenbrenner & Morris, 2006), is an extension of the ecological systems theory of human development (Bronfenbrenner, 1979). In this model, it is the transactions that occur between an individual and the interconnected, surrounding systems—an individual’s ecology—that drive human development and adaptation to stressors such as loss. These bidirectional influences imply that relationships have an effect in two directions, both away from the individual and toward the individual. As adapted from systems theory, “system” here simply refers to possible combinations of influence that organize in a form that is
more than the sum of its parts, and in which understanding is only possible by viewing the whole (see White & Klein, 2008). All parts of a system are interconnected (i.e., changes in one part of the system influence all other parts of the system) (Burr, Leigh, Day, & Constantine, 1979). Figure 1 displays a schematic representation of the hierarchical nature of nested systems in the bioecological model of human development, with the chronosystem transcending all levels across time and development.

Figure 1. The bioecological model of human development.

Bronfenbrenner viewed the developing individual as embedded in a microsystem that involves direct interactions with significant others, such as immediate family, and a
mesosystem, consisting of the interrelations of two or more microsystems, such as work and family. Proceeding outward, the exosystem consists of external settings that have only indirect effects on the developing individual, a macrosystem accounting for the sociocultural context of the individual’s life, and a chronosystem that represents change in one’s bioecological environment over the passage of time.

The most central concept of the bioecological approach is adaptation—adaptation to new life circumstances, new roles or identities, new responsibilities, changing resources, and shifting social and economic conditions, making it an ideal framework within which to model, examine, and understand the complex processes of grief recovery. In this approach, Bronfenbrenner argues that the individual develops in the context of interpersonal relationships, and that development is the outcome not only of ontogenetic factors, but of the interaction of the person with the immediate family and other components of the environment—including the loss of these components. Grief recovery and adaptation can therefore be viewed as an ecological transition, whereby a “person’s position in the ecological environment is altered as a result of a change in role, setting, or both” (Bronfenbrenner, 1979, p. 26).

**Bioecological Model of Grief Recovery**

The nested systems within the bioecological model represent the biological and contextual factors that determine the effect of life events on the individual as well as the individual’s response to a given life event, such as the death of a loved one. However, as grief is fundamentally a biopsychological phenomenon, the bioecological model of grief recovery expands the biopsychophysical sphere to include not only physical health, but also the psychological and personality characteristics the individual brings to the experience.
The biopsychophysical system, thus, has been adapted in this model to address grief recovery. The bioecological model of grief recovery recognizes Balk’s (2004) description of recovery as redefining and reintegrating the self into life.

It is well-established that numerous variables and their bidirectional influences affect grief recovery (Breen & O’Connor, 2007). Specifically, research (e.g., Center for the Advancement of Health, 2004; Sanders, 1993) indicates that these determinants are related to the circumstances of the death, such as whether or not the death was unanticipated or preventable versus anticipated or preventable. Another determinant is the quality of relationship one had with the deceased, with closer relationships between the bereaved and the deceased at times occasioning a more distressing grief response (Stroebe & Schut, 2001). Therefore, a new loss system has been added to this model to represent the overlap and interaction of the biopsychophysical influences with characteristics of the deceased, circumstances of the death, and the relationship between the bereaved and the deceased prior to the death. Thus, this model posits that factors surrounding the death disrupt the equilibrium of relations between individuals and their environment.

The next section addresses these two important components in the bioecological model of grief recovery—the expanded biopsychophysical system and the new loss system. We explain their importance and show how they are interconnected and necessary for a more comprehensive framework for understanding grief experiences.

**Biopsychophysical System**

The biopsychophysical system (see Figure 2) is comprised of person-level factors—including the physical and mental health of the individual, personality characteristics,
coping strategies, and worldviews—that combine with loss- and environmental-level processes to influence an individual’s adaptation to loss (Breen & O’Connor, 2007).

Figure 2. The bioecological model of grief recovery. The mesosystem represents the connections between microsystems.

**Loss System**

An essential feature of the bioecological model of grief recovery missing from other contemporary models of bereavement is the dynamic loss system, an interactive system taking into account characteristics of the deceased, circumstances of the death, and characteristics of the relationship between the bereaved and the deceased prior to the death—all known determinants of grief recovery (see previous section). The loss system is
dynamic because it is characterized by change, activity, and progress, depending on the number and magnitude (degree of impact) of concurrent losses in an individual’s life. Indeed, the major characteristic needed to identify something as a system is that it is separable from and has an effect on its environment (White & Klein, 2008). In this case, elements comprising the loss system are separable from and influence other environmental systems (e.g., microsystem, exosystem). As shown in Figure 3, the relationship between the bereaved and deceased prior to the death is part of the loss system that overlaps with the biopsychophysical system.

The loss system includes characteristics of the deceased, such as mental and physical health, as well as his or her age and other factors that have bidirectional influences on the biopsychophysical system and thus shape the loss experience and the individual’s bereavement reaction. The next two sections provide illustrative examples of each of the remaining loss system influences on grief recovery: (1) circumstances of the death and (2) pre-death relationship between the bereaved and deceased.

**Circumstances of the Death**

Circumstances surrounding the death directly influence the biopsychophysical system (i.e., the individual) to affect an individual’s grief recovery. An important contextual variable shown to affect how one adapts to loss-related life transitions is the event’s perceived normativity (Aldwin, 2007). Unpredictable and unanticipated ‘off-time’ events that are not normal life transitions generate significantly greater stress than ‘on-time’ life events (Walter & McCoyd, 2009). For this reason, instances of violent death, accident, or suicide can present particular challenges to regulating homeostasis within the bioecological environment, leading to more intense grief (Sanders, 1989).
The suddenness or expectedness of a death also shapes the circumstances of the loss, and therefore exerts influence on the biopsychophysical system. For example, if a loved one’s death is expected, this period of forewarning may allow the survivor to utilize preliminary coping mechanisms, gather resources, and seek out social support, therefore enabling the person to better adapt to the impending loss. Given that both cognitive and emotional effects commonly manifest as one is experiencing a traumatic loss, there are marked differences when examining the grief process as it occurs in a sudden death, compared to as it occurs with some degree of forewarning, as in a drawn-out terminal illness (Carnelley, Wortman, & Kessler, 1999; Carr, 2012). An implication of the improved outcomes associated with a period of forewarning is for practitioners to direct outreach efforts not only to the bereaved but also to individuals experiencing the final stages of a loved one’s life.

The location of the death is an important contextual loss system influence on grief recovery. Hospice care deaths are often, but not always, associated with less grief-related distress than hospital deaths (Ringdal, Jordhoy, Ringdal, & Kaasa, 2001). Further, the occurrence of multiple ongoing stressors is yet another circumstantial factor believed to negatively impact grief recovery (Stroebe, Stroebe, & Hansson, 1993). Together, these factors underscore the importance of accounting for the death circumstances in understanding grief recovery.

**Pre-death Relationship between the Bereaved and Deceased**

Bidirectional influences between the loss and biopsychophysical systems can result from relational conflicts with the deceased (see Elison & McGonigle, 2003). Research indicates that such dysfunctional pre-death relationships may lead to difficulties, whereas
positive relationships between the bereaved and the deceased may lead to benefits in adjusting to the loss (Parkes & Weiss, 1983). Moreover, grief following the death of an abuser can lead to a combination of negative emotions, such as anger, shame, and secrecy (Monahan, 2003). Although there may be time to repair strained relationships during a prolonged illness, family members may resist, fearing that such a confrontation could hasten the death.

These relationship dynamics are essential to understanding individual grief trajectories; however, because they are so personal, private, and often secretive, they can remain elusive to bereavement researchers. Indeed, research on continuing bonds with the deceased (see, for example, Klass, Silverman, & Nickman, 1996) suggests that the quality of the pre-death relationship between the bereaved and the deceased may continue to endure in the bereaved as an emotional, albeit symbolic, representation after the death.

Figure 3 shows that the loss system overlaps with the biopsychophysical system in the bioecological model of grief recovery. This overlap represents only part of the loss system, however. As noted earlier, the loss system contains characteristics of the deceased, circumstances of the death, and characteristics of the relationship between the bereaved and the deceased prior to the death. Note that the portion of overlap in the model only represents the relationship between the bereaved and the deceased, both prior to the death and as continuing bonds after the death, as this is the only part of the loss system that is also an inherent part of the biopsychophysical system of the bereaved. This overlap does not necessarily imply a bidirectional influence, although it is certainly possible to function as one. Rather, this area of overlap is unique in that any variable within this sphere requires information from both systems—from the bereaved and the deceased. In contrast, the other
two components of the loss system—characteristics of the deceased and circumstances of the death—do not overlap with the biopsychophysical system, and thus influence it in the same way as other ecological systems (e.g., microsystem) in the model.

![Diagram of Biopsychophysical and Loss Systems]

Figure 3. Biopsychophysical system and loss system overlap and interaction in the bioecological model of grief recovery.

Figure 4 presents an expanded conceptual display of the bioecological environment in a state of continual transformation from birth to death. The loss system is shown in this figure as a *latent* system that emerges with different variables, depending on the type of loss and temporal relation to the loss across the lifespan, continually transforming as it moves through the chronosystem—as the loss system transforms, so does the bioecological environment. As death is the most extreme instance of loss, *death of a spouse* is depicted in Figure 4.

The loss system is affected by the chronosystem via the mortality salience associated with the death's condition of normativity, just as it may be affected by the anticipatory grief (see Donnelly, Field, & Horowitz, 2000) associated with the presence or absence of death.
forewarning (see Figure 4). In addition, the consequences of loss are contingent upon time since loss, such that the normative trend is for the severity of one’s bereavement reaction to decline as time elapses (Carr, 2006), illustrating yet another interaction with the chronosystem.

Figure 4. Top: Depiction of loss system emergence and the resultant bioecological changes in response to the death of a spouse. Bottom: In the face of innumerable losses, transformation of the bioecological environment is continuous across the lifespan as it moves through the chronosystem.

Although this paper explicitly presents a bioecological model of grief recovery—especially with respect to the loss system—within the context of a *bereavement reaction* (i.e.,
grief resulting from a literal death), it implicitly argues that this model may be applied to other losses occasioning grief and its integration and subsequent adaptation (see Figure 5). For example, losses related to physical injury, degenerative conditions, relationship dissolution, and post-parental transitions all similarly activate the loss system. The loss system in turn influences the biopsychophysical and remaining ecological systems, the effects rippling throughout the bioecological environment across time from one transition to the next.

Figure 5. Graphical depiction of loss system salience for several important death and non-death losses across the lifespan of an individual. Note the difference in slopes for the continuum of expected versus unexpected losses. Whereas Figure 4 shows the loss system and many of its key variables, the salience of the loss system is depicted in Figure 5. Losses are inevitable catalysts for growth and change, as how we adapt to them shapes who we become. The bioecological model of grief recovery, then, is a conceptual representation of loss as a context for transformational development across the lifespan.
As grief recovery is governed in large part by loss system influences associated with the specific type of death, it is important to distinguish between different loss experiences in the application of this model. The death of a child and death of a spouse in late life represent two distinct loss experiences. To illustrate the application of the bioecological model of grief recovery, the next sections will consider each in turn, providing brief examples to contrast key loss system influences.

**Death of a Child**

Parental grief has long been recognized as the most devastating and enduring of all forms of bereavement (Arnold, Gemma, & Cushman, 2005; Dyregrov, 2004; Znoj & Keller, 2002), an even more intense bereavement reaction than the loss of a spouse or parent (Fletcher, 2002; Sanders, 1979). This is due in part to the nature of the attachment, as parents experience a distinctive connection with their children unparalleled in most other relationships (Bowlby, 1980; Rando, 1986; Sanders, 1989). Indeed, for many parents, the parent-child bond reflects the most significant relationship of their lifetime (Sidmore, 2000).

As discussed previously, when the sequence of death in a family differs from the expected order, it is particularly devastating (Murphy, Johnson, & Lohan, 2003). The death of a child is always a non-normative event for a parent; it is contrary to expected developmental progression and propels a parent into a marginal, ambiguous social role, left to grapple with death-related issues of identity as a parent (Klass, 2001). However, studies have shown that compared with parents who experience an unexpected death, parents who experience a more expected death often experience less severe grief (Oliver, 1999), may be better prepared to transition into life without the child (Gerber, 1974), and may fare better
long-term as a result of preparation (e.g., having a chance to say goodbye). These and other loss system factors related to the timing and nature of the death can have profound effects on parental grief and are therefore essential to the bioecological model of grief recovery.

Figure 6 depicts influences across bioecological systems as applied to parents who have experienced the death of a child. As indicated in this flow chart, loss system influences can directly and indirectly influence grief recovery outcomes. Note that, as part of the loss system, the location of the death can also affect the bereaved parent, with some research indicating that hospital deaths are associated with more negative grief reactions than the death of a child at home (Goodenough, Drew, Higgins, & Trethewie, 2004). Because the loss system is able to account for the unique characteristics of parental bereavement, the bioecological model of grief recovery is an ideal framework for its examination and comprehension.
Figure 6. Flow chart depiction of the bioecological model of grief recovery as applied to parents who have experienced the death of a child.

Having presented the bioecological model of grief recovery within the context of a non-normative life event—parents who experience the death of a child—the next section will apply this model within the context of a normative life event—spousal bereavement in late life.

Death of a Spouse in Late Life

Although the transition to widowhood may require more social, behavioral, and psychological adjustment than any other life change (Hobson et al., 1998; Holmes & Rahe, 1967), individual differences exist in older adults’ responses to the loss of a life partner (Bonanno et al., 2002). In addition to one's coping skills and resources (Aldwin, 2007), loss
system influences play a central role in the observed variability in the intensity and duration of the grieving process.

Older adults are assumed to experience ‘timely’ deaths. Nonetheless, research indicates that in situations of sudden or unexpected death, grief reactions are still severe (Burton, Haley, & Small, 2006). In addition, deaths as a result of human agency (Parkes, 1996) and deaths due to someone else’s negligence (Stroebe & Stroebe, 1987) are more often associated with psychological distress. Specific loss system variables interacting with the chronosystem to impact spousal bereavement in late life include the time since the death of the spouse, subsequent deaths among friends or family, and the timing of concurrent intergenerational stressors in the family (Crowe, 2006).

According to Bronfenbrenner (1979), “When one member of a dyad undergoes developmental change, the other member of the dyad will also be likely to undergo change” (p. 65). Although it may have been directed at non-death transitions, current research suggests this statement may apply equally to the death of a spouse in late life. Research by Carr and colleagues (2000) supports the assertion that characteristics of the dyadic relationship prior to death are closely tied to a number of psychological reactions affecting grief recovery.

Loneliness and emotional adjustment are major concerns of a bereaved spouse, particularly in a long, interdependent relationship in which both members had a shared identity (Moss, Moss, & Hansson, 2001). Moreover, conjugal bereavement can be especially difficult for individuals whose relationship assumed a sharp division of traditional gender roles, leaving them unprepared to assume the full range of tasks required to maintain a
household. In addition, the death of one’s spouse prompts the need to develop a new identity.

Strain can also affect the health of the caregiver in a dyad before and after the death (Hansson & Stroebe, 2006). Wells and Kendig (1997) found that those who provided caregiving for their spouse experienced lower levels of depression following widowhood than those who did not.

Loss system profiles are unique to every person and every loss. The timing of the death, nature of the lost relationship, and a host of other factors related to the death itself interact to shape an individual’s bereavement reaction. The loss system, then, is an indispensable component of the bioecological model of grief recovery, as it allows for a greater understanding of grief recovery at the level of the individual.

**Conclusion and Future Directions**

A primary aim of bereavement research is to alleviate suffering and promote well-being at the junction of life and death for the survivor in an attachment relationship. A comprehensive framework for the simultaneous consideration of person-environment transactions, rather than the strict emphasis on intrapersonal processes, is essential to advancing our understanding of grief recovery. The bioecological model of grief recovery best represents the opportunity to view the complexity of level-specific factors affecting adjustment to loss. To be sure, although this model remains a humble approximation to the much more complex phenomenon of human life, it is nonetheless a basis for dialogue, and represents a bridge—rather than a wall—between other models. Perhaps its greatest utility lies as a conceptualization, design, and interpretation instrument for bereavement researchers. Using this model, future studies could design analytic strategies to capture
influences across levels of context, emphasizing the loss system influences reviewed in this paper. The next step in moving this model from theory to real-world application is to test its viability using empirical data on, for example, spousal bereavement in late life.

Moreover, psychological adjustment to the death of a loved one is merely one type of life event that can be understood using this model of grief recovery. Researchers can adapt this framework to model different types of loss experiences, particularly those with strong parallels to the death of a loved one, such as relationship dissolution and divorce. Similarly, it would be interesting to see this model applied empirically to other, more elusive nonfinite, non-death, and ambiguous losses extending beyond literal bereavement, such as progressive illness, disability, infertility, disaster, and loss of professional identity and career aspirations. Variables included in the bioecological systems should be modified accordingly to reflect and allow measurement of the type of loss, life circumstances, culture, and context of the population under study.

In addition, although bereavement is a universal phenomenon, every grief experience is unique (see Kellehear, 2001; Rando, 1993). Therefore, personalized grief interventions are needed that will account for the specific circumstances and resources of the bereaved individual. The use of this dynamic, multidimensional model will accomplish this by promoting comprehensive measurement of variables in bereavement research and providing data upon which to develop personalized grief recovery treatment plans and policy to protect against iatrogenic intervention.

Indeed, one of the greatest barriers to effective grief intervention remains the divide between grief researchers and grief counselors (Center for the Advancement of Health, 2004). This is partly due to service providers not utilizing information presented in the
research literature (Bridging Work Group, 2005; Center for the Advancement of Health; Jordan, 2000). Thus, in using this model to conduct and disseminate research, a convergence is necessary between researchers, counselors, and clinicians in identifying cumulative risk and protective factors that predict differential functioning for the bereaved individual. For example, using the bioecological model of grief recovery as a framework, research findings and clinical discoveries can be combined to form a ‘master’ matrix of data across bioecological domains (e.g., loss system, microsystem), as part of an Individual Bioecological Grief Recovery Checklist. Thus, it is our hope that this model guides our focus from the search for universals to the understanding of variability. As a diagnostic assessment instrument, its primary utility would be to facilitate more personalized grief intervention practices, strengthening the client-therapist alliance and easing the suffering of those struggling to reestablish their equilibrium after a devastating loss.
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Manuscript 2

Testing a Biocological Model of Grief Recovery for Spousal Bereavement in Late Life
ABSTRACT

The purpose of this study was to examine a transactional, bioecological model of grief recovery, including the individual, sociocultural, and contextual influences on the grief process over time. In order to achieve this aim, a series of grief models were tested using latent growth curve (LGC) analysis. Specifically, these models included a baseline model with no independent variables or covariates; an individual-level model with two independent variables for intrapersonal influences; and a fully specified bioecological model with two independent variables for loss system and three covariates for micro, macro, and chrono systems, as well as the intrapersonal variables in the individual-level model. In sum, the analyses provided evidence that having relatively high levels of death acceptance and religiosity prior to the death of a spouse is associated with improved psychological health in the early stages of widowhood. Although the bioecological growth curve model did not evidence a better fit than the individual model in this study, it remains a useful framework accounting for a broader range of influences, with the loss system as a key to advancing bereavement research. Future studies should explore other loss system influences as they relate to circumstances of the death, characteristics of the deceased, and characteristics of the relationship between the bereaved and the deceased prior to the death. Variables included in the bioecological systems should be modified accordingly to reflect and allow measurement of the type of loss, life circumstances, culture, and context of the population under study.
Testing a Bioecological Model of Grief Recovery for Spousal Bereavement in Late Life

The aging United States population (Federal Interagency Forum on Aging-Related Statistics, 2010) has led to increased interest in older adults’ responses to stressful life events, particularly the death of a spouse (Bisconti, Bergeman, & Boker, 2006; Bonanno et al., 2002; Hansson & Stroebe, 2007; Monroe, 2008). It has been linked with numerous health outcomes and quality of life in older adults, including morbidity and mortality (McEwen, 2002; Moon, Kondo, Glymour, & Subramanian, 2011). Although bereavement research progressed significantly throughout the 20th century, recent decades have marked a major transition in theoretical approaches, resulting in the emergence of postmodern grief theories (e.g., Rubin, 1999; Stroebe & Schut, 1999). These contemporary models of coping with grief and loss have afforded a new and more scientifically-grounded portrait of the grieving process. Despite these advances, however, an emphasis remains on intrapersonal (within person) processes that influence adaptation, such as death attitudes and physical health (see, for example, Caplan & Schooler, 2003; Neimeyer, 2008), with much less focus on the significance of the context and circumstances of the grief experience (Center for the Advancement of Health, 2004; Valentine, 2006). As a result, the focus of grief interventions has largely been limited to intrapersonal deficits and resources leading to positive or pathological outcomes. This concentrated focus on the individual overlooks the central role of person-context transactions in adaptation to interpersonal loss.

To address these conceptual and empirical limitations, a transactional model is needed that will simultaneously examine individual, sociocultural, and contextual influences on an individual's grief recovery. Adapted from Bronfenbrenner’s (1979, 1986, 2001) bioecological model of human development, the bioecological model of grief recovery (see
Figure 1) is an optimal framework for examining these person-environment transactions, as it is designed to capture the effects of bereavement at the individual, family, community, and cultural levels (Romo, unpublished manuscript, 2015). Moreover, an important distinguishing feature of this model is its interactive *loss system*, which takes into account characteristics of the deceased, circumstances of the death, and characteristics of the relationship between the bereaved and the deceased prior to the death. Thus, in addition to accounting for environmental and sociocultural influences, this model emphasizes contextual influences that directly and indirectly influence grief recovery.

The current study tests the viability of the bioecological model of grief recovery by empirically contrasting it with an individual-level model of grief recovery as applied to spousal bereavement in late life. Using longitudinal data from the Changing Lives of Older Couples study (CLOC) (University of Michigan, n.d.), the individual-level model focuses on the intrapersonal predictors known to influence grief recovery, while the bioecological model includes the same intrapersonal predictors as well as *loss system* predictors related to the circumstances surrounding the loss.

The next two sections review recent scientific progress in the understanding of grief and bereavement, highlighting the growing need for more research on the transition to widowhood in late life. It is argued that the bioecological model is a more integrative, comprehensive framework for understanding this transition, thus providing the rationale for the current study: an empirical test of the bioecological model of grief recovery.

**Bereavement and Grief**

*Bereavement* is defined as “the state or condition caused by loss through death” (Cavanaugh & Blanchard-Fields, 2011, p. 513); *grief* is viewed as the feelings and reactions
experienced after a loss. It is the intrapersonal response to bereavement (Stroebe & Stroebe, 1987). Grief responses and their length are not standardized; however, it is generally accepted that grief reactions can have physical, psychological, cognitive, emotional, behavioral, and spiritual components (Dent, 2005), and that it is a multidimensional, individualized process (Hooymen & Kramer, 2006). Contemporary theorists acknowledge grieving as a dynamic process, exploring different contextual variables of grief such as concurrent stressors and social factors (e.g., Rubin, 1999), and emphasizing the importance of continuing bonds with the deceased as part of the grief process (see, for example, Klass, Silverman, & Nickman, 1996).

A key illustration of the importance of studying the correlates of grief trajectories can be observed in the widowed population, as the death of a spouse is a normative experience for individuals in the second half of life. Moreover, a substantial body of evidence indicates that widowhood is associated with an increase in illness, disease, and death for surviving spouses (McEwen, 2002; Mineau, Smith, & Bean, 2002; Moon, Kondo, Glymour, & Subramanian, 2011; Stroebe, Hansson, Stroebe, & Schut, 2001); thus, a better understanding of the factors that mitigate or exacerbate its influence is essential.

**Widowhood**

Despite continuing advances in science and medicine, shifting marital trends, and an increase in the average life expectancy, spousal bereavement remains a hallmark of late life. Of individuals 65 years of age or older, 28.1% are widowed, increasing to 59.6% for those 85 and older (U.S. Census Bureau, 2010). Widowhood disproportionately affects women: of individuals 65-74 years of age, only 6.4% of the men are widowed, compared to 24.0% of women (U.S. Census Bureau, 2010) (see Table 1).
Table 1

Percentage of U.S. Population of Widows by Age

<table>
<thead>
<tr>
<th></th>
<th>65+</th>
<th>65-74</th>
<th>75-84</th>
<th>85+</th>
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<tr>
<td>All</td>
<td>28.1</td>
<td>15.8</td>
<td>36.5</td>
<td>59.6</td>
</tr>
<tr>
<td>Men</td>
<td>12.7</td>
<td>6.4</td>
<td>17.2</td>
<td>34.6</td>
</tr>
<tr>
<td>Women</td>
<td>39.9</td>
<td>24.0</td>
<td>50.4</td>
<td>72.9</td>
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Bioecological Model of Grief Recovery

Although both intrapersonal and environmental factors are known to predict grief recovery among widow(er)s, research tends to neglect the latter (Center for the Advancement of Health, 2004; Neimeyer & Hogan, 2001; Valentine, 2006). It has been claimed that the processes underlying grief recovery are best predicted and explained by the influence of intrapersonal and environmental risk and protective factors that may precede or follow the death (Sandler, Wolchik, & Ayers, 2008), such as the context and circumstances of the death itself. A theoretical framework is needed that will recognize person-environment transactions, while emphasizing these overlooked contextual influences on grief recovery.

The bioecological model of grief recovery (Romo, unpublished manuscript, 2015) is an optimal framework for advancing the understanding of these person-context transactions. Like the two-track, dual-process, and contextual resilience models (Rubin & Malkinson, 2001; Sandler, Wolchik, & Ayers, 2008; Stroebe & Schut, 1999), the bioecological
model of grief recovery considers risk and protective factors preceding the death, as well as adaptation to the changes in the post-death ecology of the survivor. In addition to its emphasis on individual and ecological levels of influence, however, this model also includes an interactive loss system (see Figure 1).

![Figure 1. The bioecological model of grief recovery. The mesosystem represents the connections between microsystems.](image)

Humans have the innate drive to seek out and form intimate attachment bonds with people, animals, and even places or possessions (Bowlby, 1980). Once formed, a range of emotional reactions may occur when these bonds are broken. The loss system is activated in anticipation of, or in response to, the breaking of such bonds. The loss system opens
bereavement research to consider more than just the psychological characteristics of the bereaved, as it takes into account characteristics of the deceased, circumstances of the death, and the relationship between the bereaved and the deceased prior to the death.

**Influences on Grief Trajectories**

There is considerable variability in the duration and intensity of grief experienced by widowed older adults (Bonanno & Kaltman, 1999, 2001; Wortman & Silver, 1989, 2001). Prolonged or chronic grieving, delayed grief responses, and the absence of grief symptoms (Bonanno et al., 2002) represent three differing pathways. Although normative grieving usually lasts for several months (Silver & Wortman, 1980), grief-related distress can persist for years (Prigerson & Jacobs, 2001; Stroebe & Stroebe, 1987). Given this variation, grief trajectories emerge as an important conceptual issue in the present study.

The current study seeks to understand change in grief throughout the bereavement process, and at what rate this change may be occurring, to better understand variability in grief trajectories. Measuring such change in grief over time requires the use of multiwave data, enabling application of latent-variable models to the measurement of grief. The CLOC study included three waves of data post-loss. This study therefore uses latent growth curve (LGC) analysis to estimate change in grief trajectories over time.

Understanding how grief changes over time has important clinical applications. In therapy, it is important to know the normative slope (rate) of change in grief—indicating whether grief typically settles down or not, and when this is most likely to occur. It is also important for therapists to understand how predictors influence change in the grief.

The loss system may similarly improve the understanding of this variability in grief trajectories, providing a better explanation for why bereavement reactions are so
negatively valenced for some individuals, but less severe for others. Moreover, as the loss system is the distinguishing feature of this new model, this study emphasizes how influences within this system may significantly increase the explanatory power of the model over an individual-level model. To accomplish this requires incorporating variables that are known determinants of grief recovery. This study will therefore examine death attitudes and physical health as predictor variables from the biopsychophysical system, death forewarning and quality of relationship with the deceased as predictor variables from the loss system, and religious involvement, socioeconomic status, and time between pre- and post-loss assessments as important covariates in the analysis. The next section reviews research on these predictors, highlighting their influence on grief and demonstrating their utility in the present study.

Intrapersonal Predictors

*Death Attitudes.* Death attitudes have received considerable attention in the study of late-life widowhood (Fortner, Neimeyer, & Rybarczyk, 2000; Neimeyer, Wittkowski, & Moser, 2004; Tomer & Eliason, 2000). Research suggests that *death acceptance* increases in late life (Wong, Reker, & Gesser, 1994), which may influence adaptation to spousal loss (Neimeyer, 2008; Tomer, Eliason, & Wong, 2008). For example, Wong and colleagues found that widowed older adults with a high death acceptance also evidenced high levels of subjective well-being and low levels of depression. Moreover, Bonanno and colleagues (2002) found that older adults with worldviews that are more accepting of death typically experience less distressing grief. This trend suggests *death acceptance* is important to include in the current study as an intrapersonal predictor of grief recovery in late life.
Physical Health. Given the well-established link connecting physical health and psychological well-being (see, for example, Friedman & Booth-Kewley, 1987; Scheier & Carver, 1985; Stein, Keller, & Schleifer, 1985), it is not surprising that interpersonal loss has been associated with increased physical health problems in a number of studies (e.g., Jones, Bartrop, Forcier, & Penny, 2010; Stroebe, Schut, & Stroebe, 2007). In adjusting to late-life widowhood, physical health has been shown to be an important predictor of grief recovery (Martikainen & Valkonen, 1996; Mineau, Smith, & Bean, 2002; Schaefer, Quesenberry, & Wi, 1995), with compromised health at times contributing to more distress in the surviving spouses (Stroebe, Schut, & Stroebe; Umberson, Wortman, & Kessler, 1992).

These findings underscore the importance of death acceptance and physical health as important predictors of grief recovery. Accordingly, they have been included in the current study as the intrapersonal predictors in the individual-level model of grief recovery.

Loss System Predictors

Death Forewarning. Understanding the relationship between death forewarning and widowed older adults’ well-being is important because chronic illnesses or ongoing conditions for which there is no cure account for the majority of older adults’ deaths (McLeroy & Crump, 1994). Research has shown that whether the death is perceived as sudden or expected can significantly influence grief patterns (Carnelley, Wortman, & Kessler, 1999; Rando, 1986). Post-loss psychological adjustment may be more difficult for those who experience a sudden loss (Carr, 2012; Farberow, Gallagher-Thompson, Gilewski, & Thompson, 1992; Wells & Kendig, 1997). Death forewarning is therefore an important contextual factor to include in the current study as a loss system predictor of grief recovery in late life.
Quality of Relationship with the Deceased. Carr and colleagues (2000) showed that characteristics of the marital relationship have important implications for how individuals respond to widowhood. In particular, research suggests that a poor pre-loss relationship may be predictive of post-loss problematic adjustment, exacerbating grief as widowed individuals realize it is no longer possible to resolve marital conflicts (Field, 2006; Parkes & Weiss, 1983; van Doorn, Kasl, Beery, Jacobs, & Prigerson, 1998).

These findings underscore the importance of death forewarning and pre-loss marital quality as important predictors of adjustment to widowhood in late life. Accordingly, they have been included in the present study as the loss system predictors in the bioecological model of grief recovery.

Covariates

Research suggests that religious involvement may play a major role in grief recovery (Carr, Nesse, & Wortman, 2006). Religious involvement represents a microsystem-level influence in the bioecological model of grief recovery (see Figure 1). Moreover, preexisting socioeconomic factors, such as income and years of education, may also enhance or buffer the adverse effects of widowhood (Arens, 1982; Elwert & Christakis, 2008; Lopata, 1975; Norris & Murrell, 1987). Widowhood often increases economic hardship (Stimpson, Kuo, Ray, Raji, & Peek, 2007; Utz, 2006), which may, in turn, affect grief recovery. Socioeconomic status represents a macrosystem-level influence in the bioecological model of grief recovery (see Figure 1).

Although all post-loss interviews in the CLOC data were conducted six months following spousal death, the duration between the collection of pre-loss baseline data and the Wave 1 interviews ranged from 9 to 26 months because of variation in the timing of the
spouse’s death. To eliminate the possibility that variations in time between baseline and widowhood were responsible for the effects of widowhood on grief, a time gap (chronosystem-level) variable was created. Therefore, in addition to religious involvement and socioeconomic factors (i.e., years of education and income), time gap is also included as a covariate in the present study.

Drawing from the research presented in the previous sections, the individual-level model will include death acceptance and physical health as intrapersonal influences on grief, while the bioecological model will add to these influences by including death forewarning and pre-loss marital quality as loss system influences on grief, as well as religious involvement, socioeconomic status, and time gap as covariates.

The current study will therefore test the hypothesis that the fit of the bioecological growth curve model will be better than the individual-level (intrapersonal) model. If the hypothesis is supported, it will evidence that the bioecological model of grief recovery, as assessed in this study, provides a useful framework for modeling growth trajectories. This could lead to a more integrative, comprehensive understanding of grief and more efficacious grief intervention practices.

**METHOD**

**Sample and Recruitment Procedure**

The current study utilized bereaved participants’ data from the Changing Lives of Older Couples (CLOC) study, a prospective study of a two-stage area probability sample of 1,532 married individuals from the Detroit Standardized Metropolitan Statistical Area (SMSA). This study was designed to shed light on the mechanisms through which
bereavement influences subsequent physical and mental health. Specifically, the aim was to identify psychosocial and coping resources that led to resilient adjustment.

To be eligible to participate in the CLOC study, respondents had to be English-speaking members of a married couple and reside in a household where the husband was age 65 or older. All respondents were non-institutionalized and capable of participating in a two-hour home interview. Where possible, interview questions were based on short forms of standard measures that had been validated in separate studies or pilot work that preceded the CLOC study. Abbreviated forms were used to minimize the duration of the interview. The response rate for the baseline interview was 68%, consistent with that of other Detroit-area studies in that period. Baseline face-to-face interviews were conducted from June 1987 through April 1988.

Participants from the CLOC study who subsequently lost a spouse were identified using daily obituaries in three Detroit-area newspapers and monthly death-record tapes provided by the State of Michigan. To confirm deaths and obtain information about causes of death, researchers used the National Death Index (NDI). Widowed respondents were invited to participate in follow-up interviews at 6 months (Wave 1), 18 months (Wave 2), and 48 months (Wave 3) after their spouses’ deaths. Of the 319 respondents who participated in the baseline interview and lost a spouse, 86% ($n = 276$) participated in at least one and 64% ($n = 205$) participated in at least two follow-up interviews. Specifically, 250 participated in Wave 1, 210 participated in Wave 2 and 106 participated in Wave 3. The primary reasons for non-response were ill health or death at follow-up (42%) and refusal to participate (38%).

**Measures**
Dependent Variable

Grief ($\alpha = .88$) symptoms, including anxiety, despair, shock, anger, yearning, and intrusive thoughts, were measured at 6, 18, and 48 months following the death (Waves 1, 2, and 3, respectively). Nineteen items were drawn from widely-used grief scales, including the Bereavement Index (Jacobs, Kasl, & Ostfeld, 1986), Present Feelings about Loss Scale (Singh & Raphael, 1981), and Texas Revised Inventory of Grief (Zisook, DeVaul, & Click, 1982). Respondents indicated the extent to which they had experienced each symptom during the previous month. Grief was the average of the six subscale scores. See Appendix A for a list of items.

Predictor Variables

Acceptance of death ($\alpha = .65$), both an intrapersonal and biopsychophysical influence, was measured at baseline using a composite of four items that were averaged. Ratings were based on a reverse-coded scale from 1 (very true) to 4 (not true at all), with higher values indicating a higher level of acceptance of death. See Appendix B for a list of items.

Health satisfaction ($\alpha = .84$), both an intrapersonal and biopsychophysical influence, was measured at baseline using a composite of three items. The first item was measured with a five-category response ranging from 1 (completely satisfied) to 5 (not at all satisfied), the second item was measured with a five-category response ranging from 1 (excellent) to 5 (poor), and the third item was measured with a five-category response ranging from 1 (a great deal) to 5 (not at all). Items 1 and 2 were reverse coded, with higher values for all three items indicating a higher satisfaction with one's physical health. See Appendix C for a list of items.
Death forewarning, a loss system influence, was measured six months post-loss with the question: “How long before your spouse’s death did you realize that s/he was going to die?” In the current study, open-ended responses were recoded into the categories of no forewarning (reference category); modest forewarning (<1 month); and prolonged forewarning (≥1 month).

Marital quality (α = .88), a loss system influence, was measured at baseline using 10 items adapted from the Dyadic Adjustment Scale (Spanier, 1976). Positive evaluations of the marriage were measured by averaging four items, such as “How much does your (husband/wife) make you feel loved and cared for?” Negative evaluations of the marriage were measured by averaging six items, such as “How much do you feel (he/she) makes too many demands on you?” Items were scored so that higher scores indicated a more positive evaluation of the marriage. See Appendix D for a complete list of items.

Covariates

Religious involvement (α = .83), a microsystem-level influence, was measured at baseline using a composite of four items that were averaged. The first item was measured with a four-category response ranging from 1 (very important) to 4 (not at all important), the second item was measured with a five-category response ranging from 1 (more than once a week) to 5 (never), and the third and fourth items were measured with a five-category response ranging from 1 (almost always) to 5 (never). All items were reverse coded, with higher response values indicating a higher level of religious involvement. See Appendix E for a list of items.

Socioeconomic status, a macrosystem-level influence, was measured at baseline. Two indicators of socioeconomic resources were considered: education (a continuous measure
ranging from 3 to 17 years of completed schooling) and total household income (natural log of income). Respondents indicated which of 10 income categories most accurately described their economic status.

*Time gap*, a chronosystem-level influence, represents the duration (in months) between the baseline and Wave 1 interviews. Although all Wave 1 interviews were conducted six months following spousal death, the duration between the baseline and Wave 1 interviews ranged from 9 to 26 months because of variation in the timing of spouses’ deaths.

**Analytic Strategy**

Data were analyzed in *Mplus* Version 7.2 (Muthén & Muthén, 1998–2013) using a latent growth curve (LGC) model. Growth curve models examine longitudinal observations of a measure of individuals in terms of an intercept that represents the initial level of the variable at Wave 1, and the slope over time change in individuals per one unit of time (Hox, 2010). They further allow estimates of the effects of covariates on the intercept and slope.

A LGC analysis of the individual-level model of grief recovery was done, exploring the relationship between the hypothesized predictor variables of this model—death acceptance and physical health—and grief at 6, 18, and 48 months post-loss (see Figure 2). This model tested whether 1) higher levels of death acceptance and physical health pre-loss are associated with less initial grief at wave 1, and 2) higher levels of death acceptance and physical health pre-loss are associated with the rate of change in grief following the spouses’ deaths. The Chi-Square, Confirmatory Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA) fit indicators are reported.
Figure 2. Individual-level model of grief recovery. Growth curve path diagram for grief as predicted by death attitude and physical health—*independent predictor variables: death attitude and physical health; latent factors: intercept and slope; dependent variable measured at three time points: grief.*

A LGC analysis of the bioecological model of grief recovery was also done, exploring the relationship between the hypothesized predictor variables of this model—death acceptance, physical health, death forewarning, and marital quality—and grief, at 6, 18, and 48 months post-loss. Religious involvement, socioeconomic status, and time gap were included as covariates (see Figure 3). This model tested whether 1) higher levels of the stated predictor variables are associated with less grief at wave 1, and 2) higher levels of these predictors are associated with the rate of change in grief following the spouses’ deaths. The Chi-Square, CFI, and RMSEA fit indicators are reported.
Figure 3. Bioecological model of grief recovery. Growth curve path diagram for grief as predicted by death attitude, physical health, death forewarning, and quality of relationship with deceased—*independent predictor variables: death attitude, physical health, death forewarning, quality of relationship with deceased; covariates: religious involvement, SES, and time gap; latent factors: intercept and slope; dependent variable measured at three time points: grief.*

The purpose of these two LGC analyses is to test whether the addition of micro, macro, chrono, and loss system predictors in the ‘bioecological’ model is a better fit for the data than the ‘individual-level’ model with fewer predictors. It was hypothesized that the added parameters would significantly increase the explanatory power of the former model. A Chi-square test was performed to test which model is a better fit for the data.

**Procedures for Index Construction and Missing Data**
The current study utilized multi-item composites—already created for the CLOC study—to reliably measure predictor variables (death acceptance, physical health, and marital quality), the dependent variable (grief), and the covariate religious involvement. Because some of the items making up these composites contained missing data, the CLOC researchers established specific procedures for items used in construction of the index. To be consistent with other studies using CLOC data, the current study adhered to the same approach in addressing missing values as other research using this data to facilitate direct comparisons across studies.

The index was constructed using a 4-step procedure. In step 1, each item was standardized using the weighted mean and standard deviation computed across the non-missing cases for the item. In step 2, if for a single case, more than 50% of the items were non-missing, the arithmetic mean of the non-missing standardized item values was computed. Otherwise, the case was assigned a missing value for the index. In step 3, for cases with non-missing index values, the index was regressed on age and gender. For each case with a missing value, a predicted value computed using the parameter estimates from this regression was then assigned as an imputed value. In step 4, the index was standardized using the weighted mean and standard deviation across all cases for which the index applies. The final weight for the baseline sample was used in computations in steps 1, 3, and 4.

Although we used the authors’ methods for dealing with missing data in the predictors and covariates, the grief scores were not dealt with in the original data. As a result, we employed currently accepted practices for dealing with the missing grief scores through the multiple imputation features of Mplus (Acock, 2005).
RESULTS

The purpose of this study was to examine a transactional model of grief, including the individual, sociocultural, and contextual influences on the grief process over time. In order to achieve this aim, a series of grief models were tested using latent growth curve (LGC) analysis. Specifically, these models included a baseline model with no independent variables or covariates; an individual-level model with two independent variables for intrapersonal influences; and a fully specified bioecological model with two independent variables for loss system and three covariates for micro, macro, and chrono systems, as well as the intrapersonal influences variables in the individual-level model. This section outlines a summary of the statistical procedures and results—beginning with descriptions of the treatment of the data followed by results from preliminary and primary data analysis.

Prior to conducting the preliminary and primary analysis, all obtained data were cleaned and examined. Furthermore, the assumptions of parametric testing were checked, including, but not limited to, evaluation of means and standard deviations, frequencies of categorical variables, skewness, and kurtosis. There were no significant violations of the assumptions of normality and parametric analyses. Missing data were examined, and multiple imputation was used to replace missing values. Full Information Maximum Likelihood (FIML) was also used as a sensitivity analysis. Additional sensitivity analysis was performed using MLR, MLM, and WLSM estimation. None of the substantive interpretations of the models differed among the treatments of missingness, estimation procedure, or any permutation of these.

Sample Descriptives

Frequencies and percentages of categorical demographics are outlined in Table 2.
Table 2

*Frequencies and Percentages for Categorical and Ordinal Variables*

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>35</td>
<td>14.0</td>
</tr>
<tr>
<td>Female</td>
<td>215</td>
<td>86.0</td>
</tr>
<tr>
<td><strong>Race</strong></td>
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<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>209</td>
<td>83.6</td>
</tr>
<tr>
<td>African American</td>
<td>39</td>
<td>15.6</td>
</tr>
<tr>
<td>Hispanic</td>
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<td>0.8</td>
</tr>
<tr>
<td><strong>Race (Collapsed)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>209</td>
<td>83.6</td>
</tr>
<tr>
<td>Non-Caucasian</td>
<td>41</td>
<td>16.4</td>
</tr>
<tr>
<td><strong>Death Forewarning</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero</td>
<td>93</td>
<td>37.5</td>
</tr>
<tr>
<td>Hours</td>
<td>8</td>
<td>3.2</td>
</tr>
<tr>
<td>Days</td>
<td>19</td>
<td>7.7</td>
</tr>
<tr>
<td>Weeks</td>
<td>24</td>
<td>9.7</td>
</tr>
<tr>
<td>Months</td>
<td>62</td>
<td>25.0</td>
</tr>
<tr>
<td>Years</td>
<td>42</td>
<td>16.9</td>
</tr>
<tr>
<td>Missing</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Death Forewarning (Collapsed)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Forewarning</td>
<td>93</td>
<td>37.5</td>
</tr>
<tr>
<td>Modest Forewarning</td>
<td>51</td>
<td>20.6</td>
</tr>
<tr>
<td>Prolonged Forewarning</td>
<td>104</td>
<td>41.9</td>
</tr>
<tr>
<td>Missing</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Frequencies not summing to $N = 250$ and percentages not summing to 100 reflect missing data.

As shown, the majority of the sample was female (86.0%). Additionally, the sample was predominately Caucasian (83.6%), and the two Hispanic participants were recoded into
Non-Caucasian, along with the 39 African American participants for the primary analysis due to the relatively low frequency of Hispanics (0.8%). Regarding death forewarning, 37.2% of participants reported no forewarning, 20.4% of participants indicated that there was modest forewarning, and the remaining 41.9% of participants indicated prolonged forewarning. Death forewarning was also collapsed into fewer categories due to the relatively low frequencies of some of the original categories.

Means and standard deviations of continuous demographics and key variables were calculated to provide a description of the sample. On average, participants were 70.11 years old ($SD = 6.86$) and had 11.33 years of education ($SD = 2.75$) at baseline, prior to loss. Also, the average income (log-transformed for skewness) of participants was 9.76 ($SD = 0.67$), or $17,326 ($SD = 1.954$). Average income is typically log-transformed due to natural skewness inherent in assessing income. See Table 3 for full descriptives of key outcome variables.
Table 3

**Means and Standard Deviations for Continuous Variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>M</th>
<th>Mdn</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>250</td>
<td>70.11</td>
<td>70.0</td>
<td>6.86</td>
<td>49.00</td>
<td>87.00</td>
</tr>
<tr>
<td>Death Acceptance</td>
<td>250</td>
<td>.01</td>
<td>.1</td>
<td>.96</td>
<td>-3.71</td>
<td>.98</td>
</tr>
<tr>
<td>Physical Health</td>
<td>250</td>
<td>.01</td>
<td>.1</td>
<td>.90</td>
<td>-2.61</td>
<td>1.52</td>
</tr>
<tr>
<td>Religious Involvement</td>
<td>250</td>
<td>.20</td>
<td>.4</td>
<td>.93</td>
<td>-2.22</td>
<td>1.42</td>
</tr>
<tr>
<td>Income</td>
<td>250</td>
<td>9.76</td>
<td>9.8</td>
<td>.67</td>
<td>7.82</td>
<td>11.29</td>
</tr>
<tr>
<td>Years of Education</td>
<td>250</td>
<td>11.33</td>
<td>12.0</td>
<td>2.75</td>
<td>3.00</td>
<td>17.00</td>
</tr>
<tr>
<td>Gap 1</td>
<td>250</td>
<td>37.28</td>
<td>37.0</td>
<td>18.15</td>
<td>9.00</td>
<td>73.00</td>
</tr>
<tr>
<td>Gap 2</td>
<td>205</td>
<td>41.87</td>
<td>42.0</td>
<td>13.89</td>
<td>18.00</td>
<td>72.00</td>
</tr>
<tr>
<td>Gap 3</td>
<td>105</td>
<td>65.07</td>
<td>65.0</td>
<td>8.09</td>
<td>52.00</td>
<td>81.00</td>
</tr>
<tr>
<td>Marital Quality</td>
<td>250</td>
<td>-.08</td>
<td>.2</td>
<td>1.08</td>
<td>-3.86</td>
<td>1.39</td>
</tr>
<tr>
<td>Grief Wave 1</td>
<td>250</td>
<td>2.08</td>
<td>2.0</td>
<td>.59</td>
<td>1.05</td>
<td>3.89</td>
</tr>
<tr>
<td>Grief Wave 2</td>
<td>194</td>
<td>1.82</td>
<td>1.7</td>
<td>.48</td>
<td>1.00</td>
<td>3.21</td>
</tr>
<tr>
<td>Grief Wave 3</td>
<td>105</td>
<td>1.57</td>
<td>1.5</td>
<td>.44</td>
<td>1.00</td>
<td>3.21</td>
</tr>
</tbody>
</table>

*Note. N not equal to 250 reflect missing data.*

**Preliminary Analysis**

Prior to conducting the latent growth analysis, the bivariate relationships among key independent variables and demographics were assessed using Pearson’s product–moment
Correlations among death acceptance, physical health, religious involvement, income, education, time gap, death forewarning, and marital quality are shown in Table 4. As shown, most of these relationships were not statistically significant ($p > .05$); however, age was significantly and negatively related to income, education, and Gaps 1 and 2 ($r_s$ ranging from -.200 to -.149, all $p$ values < .05). Conversely, age was significantly and positively correlated with death acceptance ($r = .148, p < .05$) and marital quality ($r = .166, p < .01$). Death forewarning was not significantly related to any of the independent variables or demographics ($p$ values < .05), but marital quality was positively and significantly related to physical health ($r = .152, p < .05$) and income ($r = .171, p < .01$), in addition to the previously stated relationship with age. See Table 4 for a full description of these relationships.

---

1 All Pearson’s product moment correlations were tested for robustness by conducting Spearman’s rho non-parametric correlations. The only sensitivity was the relationship between age and death acceptance, which was not significant in the Spearman’s rho analysis.
Table 4

*Pearson’s Product Moment Correlations Among Death Acceptance, Physical Health, Religious Involvement, Income, Education, Time Gap (3 Waves), Death Forewarning, and Marital Quality*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td></td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Death Acceptance</td>
<td>.148*</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Physical Health</td>
<td>-.093</td>
<td>.008</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Religious Involvement</td>
<td>.018</td>
<td>.062</td>
<td>.111</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Income</td>
<td>-.149*</td>
<td>-.055</td>
<td>.177**</td>
<td>-.062</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Years of Education</td>
<td>-.186**</td>
<td>-.089</td>
<td>.165**</td>
<td>-.063</td>
<td>.332**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Gap 1</td>
<td>-.172**</td>
<td>-.110</td>
<td>.033</td>
<td>.034</td>
<td>.046</td>
<td>.004</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Gap 2</td>
<td>-.200**</td>
<td>.024</td>
<td>.031</td>
<td>-.063</td>
<td>.022</td>
<td>-.018</td>
<td>.768**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Gap 3</td>
<td>-.066</td>
<td>.152</td>
<td>-.115</td>
<td>-.043</td>
<td>-.079</td>
<td>.099</td>
<td>.630**</td>
<td>.955**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>10. Death Forewarning</td>
<td>.012</td>
<td>-.082</td>
<td>-.035</td>
<td>.009</td>
<td>-.027</td>
<td>-.060</td>
<td>-.040</td>
<td>.048</td>
<td>.068</td>
<td>-</td>
</tr>
<tr>
<td>11. Marital Quality</td>
<td>.166**</td>
<td>-.047</td>
<td>.152*</td>
<td>-.059</td>
<td>.171**</td>
<td>.118</td>
<td>.042</td>
<td>.033</td>
<td>.035</td>
<td>-.069</td>
</tr>
</tbody>
</table>

*Note.* *p* < .05, **p** < .01.
Correlations among grief scores across all waves are presented in Table 5. As shown, all grief scores were significantly and positively related (rs ranging from .612 to .694, all p values < .01). These results suggest that individuals who had higher grief at one time point tended to have higher levels of grief at the other time points.

Table 5

*Pearson’s Product Moment Correlations Among Grief (3 Waves)*

<table>
<thead>
<tr>
<th></th>
<th>Grief Wave 1</th>
<th>Grief Wave 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grief Wave 1</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Grief Wave 2</td>
<td>.694 **</td>
<td>-</td>
</tr>
<tr>
<td>Grief Wave 3</td>
<td>.624 **</td>
<td>.614 **</td>
</tr>
</tbody>
</table>

*Note.* *p* < .05, **p** < .01.

Correlations between grief scores across all waves and key variables of interest are outlined in Table 6. As shown, the majority of these relationships were not significant, indicating the appearance of no linear relationship between grief and measures of interest across time points. Grief was, however, significantly and negatively associated with death acceptance ($r_{wave1} = -.180, p < .01; r_{wave2} = -.160, p < .05$), indicating that those who had higher levels of grief tended to have lower levels of death acceptance. Lastly, grief was significantly and negatively associated with religious involvement ($r_{wave1} = -.125, p < .05$), indicating that individuals who reported higher levels of grief tended to report lower levels of religious involvement.
Table 6

*Pearson’s Product Moment Correlations for Grief (3 Waves) With Death Acceptance, Physical Health, Religious Involvement, Income, Education, Time Gap (3 Waves), Death Forewarning, and Marital Quality*

<table>
<thead>
<tr>
<th></th>
<th>Grief Wave 1</th>
<th>Grief Wave 2</th>
<th>Grief Wave 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-.086</td>
<td>-.122</td>
<td>-.051</td>
</tr>
<tr>
<td>Death Acceptance</td>
<td>-.180**</td>
<td>-.160*</td>
<td>-.128</td>
</tr>
<tr>
<td>Physical Health</td>
<td>-.086</td>
<td>-.069</td>
<td>.054</td>
</tr>
<tr>
<td>Religious Involvement</td>
<td>-.125*</td>
<td>-.069</td>
<td>.017</td>
</tr>
<tr>
<td>Income</td>
<td>.018</td>
<td>-.072</td>
<td>.023</td>
</tr>
<tr>
<td>Education</td>
<td>.046</td>
<td>-.004</td>
<td>.059</td>
</tr>
<tr>
<td>Gap 1</td>
<td>.119</td>
<td>.108</td>
<td>.175</td>
</tr>
<tr>
<td>Gap 2</td>
<td>.117</td>
<td>.097</td>
<td>.004</td>
</tr>
<tr>
<td>Gap 3</td>
<td>-.028</td>
<td>.010</td>
<td>.000</td>
</tr>
<tr>
<td>Death Forewarning</td>
<td>-.070</td>
<td>-.063</td>
<td>-.020</td>
</tr>
<tr>
<td>Marital Quality</td>
<td>.017</td>
<td>.038</td>
<td>.136</td>
</tr>
</tbody>
</table>

*Note. *p < .05, **p < .01.*

**Primary Analysis**

Results of the LGC models for the primary analysis are displayed in Table 7. For all three models, the factor loadings for the slopes were set linearly as 0 for Wave 1, 1 for Wave 2, and 2 for Wave 3. Altering the linear constraints to allow for non-linear growth did not change the substantive results of any of the models.
Table 7

*Baseline, Individual, and Bioecological Latent Growth Curve Models for Grief*

<table>
<thead>
<tr>
<th>Latent Factor</th>
<th>Baseline Intercept</th>
<th>Baseline Slope</th>
<th>Individual Intercept</th>
<th>Individual Slope</th>
<th>Bioecological Intercept</th>
<th>Bioecological Slope</th>
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<tr>
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<td>-.018</td>
<td>-.065</td>
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<td>Physical Health</td>
<td>--</td>
<td>--</td>
<td>.011</td>
<td>.045</td>
<td>-.125</td>
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<td>Death Forewarning</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>-.115</td>
<td>.105</td>
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<tr>
<td>Marital Quality</td>
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<td>--</td>
<td>--</td>
<td>--</td>
<td>.008</td>
<td>.050</td>
</tr>
<tr>
<td>Religious Involvement</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>-.132 †</td>
<td>.282 †</td>
</tr>
<tr>
<td>Income</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>-.012</td>
<td>-.074</td>
</tr>
<tr>
<td>Education</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>.007</td>
<td>.025</td>
</tr>
<tr>
<td>Gap</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>.006</td>
<td>.012</td>
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<table>
<thead>
<tr>
<th>Intercept/Slope Covariance</th>
<th>Baseline</th>
<th>Individual</th>
<th>Bioecological</th>
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<tr>
<td></td>
<td>-.785**</td>
<td>-.781***</td>
<td>-.827***</td>
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</table>

<table>
<thead>
<tr>
<th>Fit Indices</th>
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<th></th>
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<tbody>
<tr>
<td>$\chi^2 (df)$</td>
<td>.19 (1)</td>
<td>6.94 (5)</td>
<td>2.41 (9)</td>
</tr>
<tr>
<td>RMSEA</td>
<td>&lt;.001</td>
<td>.039</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>CFI</td>
<td>1.000</td>
<td>.988</td>
<td>1.000</td>
</tr>
</tbody>
</table>

*Note.* †$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$. Estimates are standardized.
Model fit was assessed by using Root Mean Square Error of Approximation (RMSEA), Confirmatory Fit Index (CFI), and Chi-square values, following the convention outlined by Hu and Bentler (1999). An RMSEA of less than .08, a CFI of more than .90, or a Chi-square with \( p > .05 \) indicate an acceptable model fit. The intercept paths were constrained to 1. The slope paths were constrained to 0, 1, 2, a linear model that was not substantially different from a model with slope paths of 0, 1, 3.5. As shown, the model fit for the baseline model (with no independent variables or covariates) met the criteria for acceptable model fit for all but the chi-square values, which are dependent upon sample size (RMSEA = .00; CFI = 1.00; \( \chi^2 \) (3) = .19, \( p < .001 \)).

![Diagram of model fit](image)

**Figure 4.** Baseline model of Grief. *\( p < .05 \), **\( p < .01 \), ***\( p < .001 \).

Only the intercept in the baseline model was significantly different from 0, and there was no significant overall trend in grief over time for the sample as a whole (\( p > .05 \)), see Figure 4. This finding indicates that after accounting for the effects in the model, grief did not change across 4 years after death of spouse. However, there was a significant association between the intercept and slope (\( \beta = -.785, p = .004 \)), indicating that individuals who had higher levels of grief at 6-months post-loss had greater reduction in grief over
time. Not shown in Table 7, there was significant variance for the intercept ($\beta = .267, p < .001$); thus, there was considerable variation in initial grief scores, but there was not significant individual variance in grief trends ($\beta = .023, p = .138$).

As shown in Figure 5, the individual model maintained a good model fit with an RMSEA of .039, a CFI of .988, and a Chi-square of 6.94 ($p = .225$); however, neither the intercept nor slope were statistically significant for the independent variables death acceptance and physical health. Though the predictors were not significant, the covariance of the intercept and slope did remain significant ($\beta = -.781, p = .001$).

\[ \text{Intrapersonal Influences} \]
\[ \text{Death Acceptance} \]
\[ \text{Physical Health} \]
\[ \text{I} \]
\[ \text{S} \]
\[ \text{Wave 1: Grief at 6 Months Post-loss} \]
\[ \text{Wave 2: Grief at 18 Months Post-loss} \]
\[ \text{Wave 3: Grief at 48 Months Post-loss} \]

\textbf{Figure 5.} Path coefficients of the individual-level Grief latent growth curve model. *$p < .05$, **$p < .01$, ***$p < .001$.

The model fit for the bioecological model also had a good fit (RMSEA = .00; CFI = 1.00; $\chi^2 (9) = 2.41, p = .983$), see Figure 6. Only the intercept for death acceptance was a statistically significant predictor ($\beta = -.199, p = .007$), suggesting that individuals with
higher death acceptance scores would have lower initial grief scores. However, religious involvement was a marginally significant predictor for the intercept ($\beta = -132, p = .080$) and slope ($\beta = .282, p = .064$). These marginally significant relationships provide suggestive evidence that individuals with higher religious involvement scores would have lower initial grief scores and that individuals with higher religious involvement scores will have greater changes in grief scores over time. Also, the intercept and slope covariance remained significant and negative ($\beta = -.827, p = .009$).
Figure 6. Bioecological model of Grief latent growth curve model. \( p < .10, \ast p < .05, \ast\ast p < .01, \ast\ast\ast p < .001 \).

Note. All paths are shown as standardized path coefficients for the purpose of comparison. Unstandardized paths from the intercept to grief scores were set to 1. Unstandardized paths from the slope to wave 1 grief was set to 0, from the slope to wave 2 grief was set to 1, and from the slope to wave 3 grief was set to 2.
A primary goal of these analyses is to determine if the bioecological model has a better model fit than the individual model; therefore, it is necessary to test whether the bioecological model fits better than the individual model. This result can be determined with a simple calculation using Chi-square values and following formulas:

\[ \chi^2_{\text{diff}} = \chi^2_{\text{Indv}} - \chi^2_{\text{Bio}} \]

\[ \text{df}_{\text{diff}} = \text{df}_{\text{Indv}} - \text{df}_{\text{Bio}} \]

Here, “Indv” indicates the individual level model, “Bio” indicates the bioecological model, “diff” represents the difference between the values, and “df” represents degrees of freedom. These calculations yielded \(\chi^2_{\text{diff}} = 4.52\) and \(\text{df}_{\text{diff}} = 18\). The resulting \(p\) value is .999; therefore, the bioecological model is not a significantly better model than the individual model. There is a slight increase in model fit for the bioecological model, but too many degrees of freedom are lost for this to be a statistically significant improvement in overall model fit. Therefore, this finding does not provide evidence that the bioecological model is a better model than the individual model. Including more variables representing the loss system could yield a different result.
DISCUSSION

This study addressed a gap in the research on grief recovery after loss of spouse in late life by testing a new framework that includes person-environment transactions, as well as intrapersonal processes in predicting grief and the trajectory of grief across 4 years after death of spouse. The bioecological model of grief recovery represents a way of integrating interpersonal, intrapersonal, and contextual influences to account for the trajectory of bereavement after loss of spouse in late life.

Consistent with the general bereavement literature (e.g., Hansson & Stroebe, 2007; Stroebe, Stroebe, & Hansson, 1993), this study found that levels of older adults’ grief decreased across four years following the death of spouse. This suggests that an adaptive process occurs in which the bereaved “come to grips” with the loss of spouse and experience less grief over 4-years time (Dutton & Zisook, 2005; Hansson & Stroebe, 2006).

Grief six months after loss of spouse was correlated with grief scores at 18 and 48 months after loss of spouse. Thus, spouses more susceptible to grief 6-months after their loss tended to have more grief after both 18 months and 4 years. These associations were, in part, evidence of the test-retest reliability of the grief measure. These longitudinal scores were also used in growth curve models to examine the trajectory of grief over time.

In the growth curve model for grief trajectory, there was significant variation in the intercept of grief. Thus, as indicated in our simpler tests, 6 months after loss of spouse, some spouses experienced more grief than others. In the growth curve model, however, there was no evidence of statistically significant variation in the slope of grief from 6 to 48 months. Thus, those bereaved spouses who experienced either high or low grief 6 months after their spouse died tended to have the same level of grief after 48 months time.
Death acceptance and physical health were identified as determinants of grief recovery (Bonanno et al., 2002; Martikainen & Valkonen, 1996; Mineau, Smith, & Bean, 2002; Neimeyer, 2008; Tomer, Eliason, & Wong, 2008), and thus selected as biopsychophysical variables in both the individual (intrapersonal) and the bioecological growth curve models. As expected, older individuals had higher levels of death acceptance. Moreover, individuals more accepting of death prior to their spouse’s passing reported significantly less grief throughout the first 18 months following the loss. This is consistent with Bonanno et al. (2002), who suggested that resilient individuals typically maintain worldviews that are more accepting of death and that these serve to buffer the bereavement. In addition, the majority of existing bereavement research focuses on so-called negative death attitudes (e.g., Loo, 1984; Neimeyer, Moore, & Bagley, 1988; Neimeyer & Van Brunt, 1995; Tobacyk & Eckstein, 1980; Tomer, Eliason, & Wong, 2008). The present study helped to expand our current knowledge regarding death attitudes by increasing our understanding of both the correlates and consequences of positive attitudes (i.e., death acceptance) toward death and dying. Although correlated with income and education, physical health was not a significant predictor in the individual or bioecological growth curve models. This is in contrast to previous research (e.g., Lopata, 1975; Norris & Murrell, 1987), which has shown sound physical health to be a personal resource that may serve to soften the psychological toll of widowhood. Perhaps the use of more objective, behavioral indices, rather than self-reports would yield findings more consistent with prior research linking psychological health with physical well-being (see, for example, Friedman & Booth-Kewley, 1987; Stein, Keller, & Schleifer, 1985).
The loss system is the distinguishing feature of the bioecological model of grief recovery. Death forewarning and marital quality were identified as known determinants of grief recovery (Carr et al., 2000; Carnelley, Wortman, & Kessler, 1999; Rando, 1986), and thus selected as loss system variables in the bioecological growth curve model. Contrary to expectations, death forewarning was not a significant predictor in the bioecological growth curve model. These nonsignificant results may be due to the way death forewarning was collapsed (i.e., combining hours with weeks, and months with years), as the creation of somewhat arbitrary categories removes variability (e.g., between months and years). Similarly, while marital quality was correlated with age, physical health and income, it was not a significant predictor in the bioecological growth curve model. As these data were gathered at baseline (i.e., prior to the spouse’s death), perhaps inclusion of the bereaved spouse’s evaluation of marital quality is necessary for an accurate measurement of the relationship between the bereaved and the deceased prior to the death.

Religious involvement was identified as a known determinant of grief recovery (Carr, Nesse, & Wortman, 2006), and thus selected as a microsystem variable in the bioecological growth curve model. Religious involvement was shown to be marginally associated with less grief at the initial post-loss measurement, as well as with a reduction in grief over time in the bioecological growth curve model. Although these were marginally significant findings, they nonetheless demonstrate the utility of including religious involvement as a predictor of grief recovery. These findings, together with those of Neff and Hoppe (1993), suggest religious involvement represents a fundamental form of social support, one that provides a protective cushion of stability from which the grief course unfolds.
Income and years of education were identified as known determinants of grief recovery (Arens, 1982; Elwert & Christakis, 2008; Lopata, 1975; Norris & Murrell, 1987), and thus selected as macrosystem variables in the bioecological growth curve model. Although income and education were not significant predictors in the bioecological growth curve model, each were correlated with physical health. Future studies should explore alternative macrosystem variables, such as home ownership and ethnicity.

**Limitations and Future Directions**

Although the current study has a number of strengths, several important limitations warrant discussion. First, consider the timing of assessments. Emotional well-being can change and evolve significantly throughout the course of bereavement. It may be that measuring someone’s grief 6-48 months after his or her spouse’s death fails to account for important factors that contribute to the observed levels of grief. For example, it is possible that some of the participants had to live with a terminally ill spouse for a period of time leading up to his or her eventual death. Given the vast literature on anticipatory grief (see, for example, Carr, 2012; Lindemann, 1944; Rando, 1986), one can surmise marked differences in the emotional well-being of the participants for an unspecified time prior to the death. It is reasonable to assume that important factors, such as one’s perspective and circumstance, may undergo significant changes as the pre- and post-loss grieving process and adaptation continues, further influencing psychological health outcomes. Future studies should begin examining grief trajectories prior to the death of a spouse to understand better the nature and scope of the changes that accompany spousal loss and their implications for psychological adjustment.
In addition, the grief course is commonly experienced in vacillating waves. As grief is not always experienced in a linear and predictable progression of stages, three time points over four years limits the ability to interpret or generalize from this study; therefore, an accurate representation of this vacillation in the grief process is unlikely. Using dynamical systems (Bisconti & Bergeman, 2007) to assess and predict trajectories of grief may be an effective alternative, as this analytical technique is sensitive to within-person oscillation in emotional states. Similarly, a measurement-burst design—in which repeated bursts of intensive daily assessments are nested within the long-term longitudinal study—may be another effective alternative, as each of these approaches would show both the short- and long-term variability in grief.

There is also the consideration of direction of causality. One cannot determine conclusively causality with these data, primarily because one can never be sure that all known factors composing death acceptance, health satisfaction, death forewarning, marital quality, religious involvement, and the grief course were included in the analyses. Regardless, by using four time points, this study addressed one traditional criterion for establishing causality—time order (baseline predictors occurred before grief was measured).

What’s more, the CLOC data collection for W1 through W3 occurred nearly two decades ago; accordingly, they were reflective of demographic trends of the time (e.g., gender differences in life expectancy). Thus the majority of the sample were female (n = 86%). It would be interesting to replicate this study using the most recent cohort of older adults to reflect shifting national trends in longevity, marriage, and of a more secular society on religious involvement.
Similarly, a methodological limitation specific to the study of bereavement concerns sample representativeness. By design, this and other studies typically include the most physically and economically advantaged—all participants are cognitively competent, community dwelling, married, and whose spouses were aged 65 or older at the time of the baseline interview. Accordingly, caution should be taken when generalizing these findings to the larger population of bereaved older adults. Moreover, there was substantial attrition from the original sample that could have influenced the fit and coefficient estimates in the models in Manuscript 2.

Another concern, as with most bereavement research, is that this study reflects participant self-reports and interviewer observations. Thus, on a variable such as religious involvement, a discrepancy may exist between self-reported and actual religious involvement. In order to differentiate bereavement trajectories, future studies should use more objective, behavioral indices to predict bereavement reactions.

Previous research has relied primarily on retrospective accounts of attitudinal positions held prior to widowhood. Here, assessments of death attitudes were not affected by positive or negative recall bias because prospective data were used to examine their role on grief following spousal loss. Despite this advantage, the CLOC composite index does not provide a comprehensive assessment for death acceptance, as all four items load strongly on a single path to acceptance, identified by Wong (2000) as neutral acceptance. For a multidimensional assessment, future studies should include a measure based on Wong, Reker, and Gesser’s (1994) Three-Component Model of Death Acceptance. Such an integration of all three approaches—neutral, approach, and escape—combined with the
more traditional focus on death anxiety, threat, and depression, would be ideal in addressing negative, neutral, and even favorable attitudes toward death and dying.

Lastly, having just the two variables—death forewarning and marital quality—as measures is a rather limited representation of the loss system described by Romo (2015). As the CLOC study is limited in available measures, future studies should explore other loss system influences, such as circumstances of the death. These may include normativity (e.g., homicide versus chronic illness), intentional or non-intentional death (e.g., suicide versus accident), and location of the death (e.g., hospital versus home hospice). Other loss system influences to include are characteristics of the deceased (e.g., mental health, physical health, age) and characteristics of the relationship between the bereaved and the deceased prior to the death (e.g., level of attachment, emotional dependence, tolerance of separation from spouse, emotional reliance).

We also need to consider this study’s contributions in context. Among the most significant is the introduction of a prospective design over a 4-year period into the study of age-related psychological adjustment to widowhood. In addition, we must recognize that older people have more loss-related events. Specifically, they are more likely to face bereavement as their spouses, siblings, and friends die. Peterson and Greil (1990) found that death experience positively correlated with religiosity, suggesting that experiences with death incline people toward greater religious involvement. Therefore, an important, unanswered question is whether religion is reflective of a developmental process or a cohort effect. Moreover, these results continue to highlight the need for more research to distinguish between measures of religious orthodoxy and belief on the one hand, and of church attendance and involvement in religious activities on the other, insofar as these may
have quite different implications for the psychological adjustment of widowed older adults. Simply put, these results underscore the need for more research to disentangle the risk and protective effects of particular components of religiosity, to determine their permanence, and to understand better how they are reinforced or undermined by major life events.

In sum, the analyses provided evidence that having relatively high levels of death acceptance and religiosity prior to the death of a spouse is associated with improved psychological health in the early stages of widowhood. Although the bioecological growth curve model did not evidence a better fit than the individual model in this study, it remains a useful framework accounting for a broader range of influences, with the loss system as a key to advancing bereavement research.
Appendix A

Items Assessing Grief

1. During the past month, have you felt afraid of what lies ahead for you?
2. Have you felt extremely anxious and unsettled during the past month?
3. During the past month, have you felt worried about how you would manage your day-to-day affairs?
4. Has life seemed empty?
5. Have you felt as though you were in a state of shock?
6. During the past month, have you felt as though you couldn’t believe what was happening?
7. Have you felt emotionally numb?
8. During the past month, have you felt resentful or bitter about your (husband’s/wife’s) death?
9. Have you felt that the death of your (husband/wife) was unfair?
10. In the past month, have you felt anger toward God?
11. Have you felt empty inside, like an important part of you is missing?
12. In the past month, have you felt that life has lost its meaning?
13. Have you found yourself longing to have (him/her) with you?
14. People have different reactions to the death of a husband or wife. During the past month, have you had painful waves of missing your (husband/wife)?
15. During the past month, have you experienced feelings of intense pain or grief over the loss of your (husband/wife)?
16. During the past month, have you experienced feelings of grief, loneliness, or missing your (husband/wife)?
17. During the past month, have you had difficulty falling asleep because thoughts relating to (him/her) kept coming into your mind?
18. Have you tried to block out memories or thoughts of your (husband/wife)?
19. During the past month, did you find that you couldn’t get thoughts of your (husband/wife) out of your mind even when you wanted to?

Each of the above items was measured with a four-category response ranging from 1 (no, never) to 4 (yes, often).
Appendix B

Items Assessing Death Acceptance

1. Death is simply part of the process of life.
2. I don’t see any point in worrying about death.
3. I would neither fear death nor welcome it.
4. I am resigned to the fact that we all have to die

Baseline death acceptance was assessed using the average of a four-item composite already created for the CLOC study. Ratings were based on a reverse-coded scale from 1 (very true) to 4 (not true at all), with higher values indicating a higher level of acceptance of death.
Appendix C

Items Assessing Satisfaction with Physical Health

1. In general, how satisfied are you with your health?
2. How would you rate your health at the present time?
3. How much are your daily activities limited in any way by your health or health-related problems?

Baseline satisfaction with physical health was assessed using a three-item composite already created for the CLOC study.
Appendix D

Items Assessing Marital Quality

1. How much does your (husband/wife) make you feel loved and cared for?
2. How much is (he/she) willing to listen when you need to talk about your worries or problems?
3. Thinking about your marriage as a whole, how often do you feel happy about it?
4. Taking all things together, how satisfied are you with your marriage?
5. How much do you feel (he/she) makes too many demands on you?
6. How much is (he/she) critical of you or what you do?
7. There are some serious difficulties in our marriage.
8. My (husband/wife) doesn’t treat me as well as I deserve to be treated.
9. How often would you say you and your (husband/wife) typically have unpleasant disagreements or conflicts?
10. How often do you feel bothered or upset by your marriage?

Baseline marital quality was assessed using 10 items from the Dyadic Adjustment Scale (Spanier, 1976). Items 1, 2, 5, and 6 above were measured with a five-category response ranging from 1 (a great deal) to 5 (not at all). Items 3 and 10 above were measured with a five-category response ranging from 1 (almost always) to 5 (never). Item 4 above was measured with a five-category response ranging from 1 (completely satisfied) to 5 (not at all satisfied). Items 7 and 8 above were measured with a four-category response ranging from 1 (very true) to 4 (not true at all). Item 9 above was measured with a five-category response ranging from 1 (more than once a week) to 5 (never). Positive evaluations of the marriage were measured by averaging items 1-4 above, while negative evaluations of the marriage were measured by averaging items 5-10 above. Items 1-4 were reverse-coded, with higher values for all ten items indicating a higher level of marital quality.
Appendix E

Items Assessing Religious Involvement

1. In general, how important are religious and spiritual rituals in your day-to-day life?
2. How often do you usually attend religious services?
3. When you have problems or difficulties in your family, work, or personal life, how often do you seek spiritual comfort and support?
4. When you have decisions to make in your everyday life, how often do you ask yourself what your religious institution would want you to do?

Baseline religious involvement was assessed using the average of a four-item composite already created for the CLOC study. All items were reverse-coded, with higher response values indicating a higher level of religious involvement.
References


Bronfenbrenner, U. (1986). Ecology of the family as a context for human development:


GENERAL CONCLUSION

A primary aim of bereavement research is to alleviate suffering and promote well-being at the junction of life and death for the survivor in an attachment relationship. A comprehensive framework for the simultaneous consideration of person-environment transactions, rather than just a strict emphasis on intrapersonal processes, is essential to advancing the current understanding of grief recovery. This dissertation presented a bioecological model of grief recovery with the addition of a 'loss system' level of influence—capturing characteristics of the deceased, circumstances of the death, and the relationship between the bereaved and the deceased prior to the death—to simultaneously account for the person- and environment-level systems of influence. To move this model from theory to real-world application, the viability of this model was tested by empirically contrasting it with an individual-level model of grief recovery as applied to spousal bereavement in late life. The individual-level model focused on the intrapersonal predictors known to influence grief recovery, while the bioecological model included the same intrapersonal predictors as well as loss system predictors related to the circumstances surrounding the loss. Although the bioecological growth curve model did not evidence a better fit than the individual model in this study, it remains a useful framework accounting for a broader range of influences, with the loss system as a key to advancing bereavement research. Accordingly, this dissertation advances the field by allowing researchers to model grief trajectories using a conceptually distinct systems model conceived for the express purpose of examining grief recovery.
Although the theoretical and empirical models presented here represent only a limited approximation of the more complex phenomena of a human reaction when a spouse dies, it provides a new, more comprehensive framework for understanding grief and how it changes over time. Perhaps its greatest utility lies in its theoretical conceptualization of a loss system, and how that loss system can be tested using growth curve statistical models as described in Manuscript 2. This novel approach holds great promise for bereavement researchers. In addition, Manuscript 1 showed how this bioecological model of grief recovery can also be utilized in developing therapeutic efforts to reduce negative psychological and physiological reactions to loss of close family members. Furthermore, the loss model describes reactions to loss that promote positive adaptations, a process rarely addressed in the empirical literature.

Moreover, psychological adjustment to the death of a loved one is merely one type of life event that can be understood using this model of grief recovery. Researchers can adapt this framework to model different types of loss experiences, particularly those with strong parallels to the death of a loved one, such as relationship dissolution and divorce. Similarly, this model could be applied empirically to other loss experiences, such as progressive illness, disability, infertility, and disaster. Variables included in the bioecological systems should be modified accordingly to reflect and allow measurement of the type of loss, life circumstances, culture, and context of the population under study.

In addition, although bereavement is a universal phenomenon, every grief experience is unique (see Kellehear, 2001; Rando, 1993). Therefore, ultimately, personalized grief interventions to reduce negative outcomes and enhance positive outcomes are needed that will take into account the specific circumstances and resources of
the bereaved individual. The use of this multidimensional model will provide for this by requiring that more diverse, comprehensive measures be collected in bereavement research.

One of the greatest barriers to effective grief intervention remains the divide between grief researchers and grief counselors (Center for the Advancement of Health, 2004). This is partly due to service providers not utilizing information presented in the research literature (Bridging Work Group, 2005; Center for the Advancement of Health; Jordan, 2000). Thus, in applying this loss system model to conduct and disseminate research, a convergence is necessary between researchers, counselors, and clinicians in identifying cumulative risk and protective factors that predict differential functioning for the bereaved individual.

Limitations

Although this dissertation has a number of strengths, several important limitations warrant discussion. First is the consideration of the timing of assessments. Emotional well-being can change and evolve significantly throughout the course of bereavement. It may be that measuring someone’s grief 6-48 months after their spouse’s death fails to account for important factors that contribute to the observed levels of grief. For example, it is possible that some of the participants had to live with a terminally ill spouse for a period of time leading up to his or her eventual death. Given the vast literature on anticipatory grief (see, for example, Carr, 2012; Lindemann, 1944; Rando, 1986), one can surmise marked differences in the emotional well-being of the participants for an unspecified time prior to the death. It is reasonable to assume that important factors, such as one’s perspective and circumstance, may undergo significant changes as the pre- and post-loss grieving process
and adaptation continues, further influencing grief outcomes. Future studies should begin examining grief trajectories prior to the death of a spouse to understand better the nature and scope of the changes that accompany spousal loss and their implications for psychological adjustment.

In addition, the grief course is commonly experienced in vacillating waves. As grief is not always experienced in a linear and predictable progression of stages, three time points over four years limits the ability to interpret or generalize from this study; therefore, an accurate representation of this vacillation in the grief process is unlikely. Using dynamical systems (Bisconti & Bergeman, 2007) to assess and predict trajectories of grief may be an effective alternative, as this analytical technique is sensitive to within-person oscillation in emotional states. Similarly, a measurement-burst design—in which repeated bursts of intensive daily assessments are nested within the long-term longitudinal study—may be another effective alternative, as each of these approaches would show both the short- and long-term variability in grief.

There is also the consideration of direction of causality. One cannot determine conclusively causality with these data, primarily because one can never be sure that all known factors composing death acceptance, health satisfaction, death forewarning, marital quality, religious involvement, and the grief course were included in the analyses. Regardless, by using four time points, this study addressed one traditional criterion for establishing causality—time order (baseline predictors occurred before grief was measured).

What’s more, the CLOC data collection for W1 through W3 occurred nearly two decades ago; accordingly, they were reflective of demographic trends of the time (e.g.,
gender differences in life expectancy). Thus the majority of the sample were female (n = 86%). It would be interesting to replicate this study using the most recent cohort of older adults to reflect shifting national trends in longevity, marriage, and of a more secular society on religious involvement.

Similarly, a methodological limitation concerns sample representativeness. By design, this and other studies typically include the most physically and economically advantaged—all participants are cognitively competent, community dwelling, married, and whose spouses were aged 65 or older at the time of the baseline interview. Accordingly, caution should be taken when generalizing these findings to the larger population of bereaved older adults. Moreover, there was substantial attrition from the original sample that could have influenced the fit and coefficient estimates in the models in Manuscript 2.

Another concern is that this study reflects participant self-reports and interviewer observations. Thus, on a variable such as religious involvement, a discrepancy may exist between self-reported and actual religious involvement. In order to differentiate bereavement trajectories, future studies should use more objective, behavioral indices to predict bereavement reactions.

Previous research has relied primarily on retrospective accounts of attitudinal positions held prior to widowhood. Here, assessments of death attitudes were not affected by positive or negative recall bias because prospective data were used to examine their role on grief following spousal loss. Despite this advantage, the CLOC composite index does not provide a comprehensive assessment for death acceptance, as all four items load strongly on a single path to acceptance, identified by Wong (2000) as neutral acceptance. For a multidimensional assessment, future studies should include a measure based on Wong,
Reker, and Gesser's (1994) Three-Component Model of Death Acceptance. Such an integration of all three approaches—neutral, approach, and escape—combined with the more traditional focus on death anxiety, threat, and depression, would be ideal in addressing negative, neutral, and even favorable attitudes toward death and dying.

Lastly, having just the two variables—death forewarning and marital quality—as measures is a rather limited representation of the loss system described in Manuscript 1. As the CLOC study is limited in available measures, future studies should explore other loss system influences, such as circumstances of the death. These may include normativity (e.g., homicide versus chronic illness), intentional or non-intentional death (e.g., suicide versus accident), and location of the death (e.g., hospital versus home hospice). Other loss system influences to include are characteristics of the deceased (e.g., mental health, physical health, age) and characteristics of the relationship between the bereaved and the deceased prior to the death (e.g., level of attachment, emotional dependence, tolerance of separation from spouse, emotional reliance).

Future Directions

Two distinct, real-world scenarios will demonstrate how to understand more fully and to illustrate the practical implications that can be drawn from this dissertation. First, consider the clinical setting in which a clinician is working with a client who has just lost his or her spouse. The psychological adjustment of the newly widowed individual is clearly an important issue in this situation. However, care must be taken in how the individual channels these labile emotions, because as Aldwin (2007) pointed out, coping in a nonculturally prescribed way will often lead to greater distress. Based on the results from this dissertation, the clinician can suggest a number of coping strategies that are both
effective and culturally appropriate. For example, one of the key findings that can be applied directly to this real-world scenario is the relationship between religiosity and grief. Thus, the clinician could encourage the bereaved to participate in religious activities and to incorporate religion into their worldview. This would not only provide the individual with a social support network to help buffer the psychological toll of the loss but also could help the individual to regain a sense of control over his or her changed life due to religious ideology. Additionally, given the relationship observed in this dissertation between death acceptance and grief in the early stages of widowhood, the clinician could provide cognitive behavioral therapy (CBT) for the individual to facilitate cognitive restructuring of the individual’s worldview and beliefs surrounding death.

For a second example, assume the perspective of a manager or director in charge of a community service agency for the elderly. There are a number of implications, based on this dissertation, relevant for a community to utilize to increase the likelihood that its elderly citizens are equipped to cope when they lose a spouse. For instance, drawing again from the findings on religiosity and death acceptance, the professional manager at a social service agency might establish and maintain strong affiliations with religious organizations. This would ensure that there are cognitive behavior therapy services available when needed. But in addition, it would provide easy access for bereaved older adults to the types of activities that encourage greater participation in the community in general (e.g., volunteer work, networking, support groups, leisure activities), as well as the means of utilizing these activities (e.g., transportation services).

These practical applications have direct relevance to everyday life and are intended to underscore the importance not only of generating knowledge through bereavement
research, but also of utilizing this knowledge. That is, by putting research findings into practice, we afford bereaved individuals direct benefits from our research endeavors. However, because of widely varying individual grief patterns, a strategy that helps one person cope may not help the next. Therefore, personalized interventions are needed that will account for the specific circumstances and resources of the bereaved individual. Finally, it is important to recognize that, while facilitating the healing processes of those who have suffered the death of a loved one is a central aim of all bereavement research, grieving remains a natural, universal and essential part of any major loss. This research is still in its infancy and ultimately it will be important to explain how loss can be accepted and embraced by individuals in their own way.
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