Published in final edited form as:

J Fam Theory Rev. 2020 June ; 12(2): 238–263. doi:10.1111/jftr.12369.

Aging Together in Enduring Couple Relationships: A Life Course Systems Perspective

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Abstract

This article introduces and demonstrates the use of an integrated life course systems perspective to advance the study of the aging processes of couples in enduring relationships. This objective is accomplished by bridging the life course and systems perspectives to conceptualize the couple as a functioning system and to locate couple dynamics within a longitudinal life course context in order to identify multilevel relational mechanisms that explain partners’ aging outcomes in their broader socioeconomic and longitudinal context. Informed by this integrated theoretical perspective, testable hypotheses related to aging processes are derived, and analytical methodologies that can advance the research on couple aging processes are demonstrated. Identifying these relationship-health processes and contextual considerations provides insight into leverage points for the development and implementation of prevention and intervention efforts to facilitate positive aging outcomes. Directions for further theoretical and analytical advances in the area of couple aging are discussed.

Keywords

Adult development; aging families; application of theory and method; health; marriage

Minimal research has investigated aging in the context of the couple relationship, even though intimate couple relationships are often among the most salient relationships for older adults. Thus, theoretical developments that inform research on couples’ aging processes and later-life outcomes in the context of enduring but changing couple relationships are an important task for family gerontologists. In particular, such theoretical advances must acknowledge continuity and change in experiences over the life course. This article advances this direction of theorizing in its specific focus on couples in enduring relationships during the latter half of the life course, beginning in their mid- to later years (40 years

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of age and older), when signs of the aging process typically begin to appear. Although the specific focus on enduring couple relationships means that this model in its original conceptualization is specific to couples entering their mid- to later years with already-established relationships (e.g., those married in their 20s), the conceptual and analytical models discussed may be extended to various relationship types (e.g., same-sex couples) and less established relationships (e.g., cohabiting couples) as well—a point to which we return when considering the application to other populations).

Gerontological research has frequently utilized the successful aging model (Rowe & Kahn, 1998) to study aging outcomes, such as an individual's declines in mental and physical health and cognition as well as social relations. According to the successful aging model, an individual's attitudes, beliefs, and actions, as well as physical and cognitive capacities, contribute to established lifestyles, including health behaviors early in adulthood that continue into later adulthood (Rowe & Kahn, 1998). However, the successful aging model has been criticized for its limited scope and lack of consideration of contextual factors, including the accumulation of, and changes in, life experiences over the life course, that likely influence aging outcomes (Stowe & Cooney, 2015). In particular, overlooking stable and changing characteristics of these long-term relationships as an influential context is problematic given the salience of the couple relationship at later life stages.

In addition to the successful aging model, several social psychological theoretical perspectives have been used to explain aging outcomes. Among them, the life course perspective (Elder, 1998; Settersten, 2003; Stowe & Cooney, 2015) and systems perspective (Broderick, 1993) have been widely used by family and life course researchers to explain aging outcomes. Both the systems and the life course perspectives have important strengths that can enhance the study of aging couples, but they also have limitations. As we will discuss in more detail, the systems perspective emphasizes the importance of relational dependence and family dynamics in explaining changes in health and well-being (Broderick, 1993). In this article, we consider enduring couples as a relatively stable dyadic system and apply principles of the systems perspective to effectively consider aging in a relational context. However, the systems perspective lacks an adequate focus on the continuity and accumulation of life experiences over time (i.e., situating the individual or couple in the context of previous experiences). The systems perspective also fails to adequately consider the influence of structural socioeconomic context (e.g., historical time and place, social class, community).

In contrast to the systems perspective, the life course perspective emphasizes the continuity and changes in individuals' life experiences over the life course (including the accumulation of these experiences) while also highlighting the impact of distal and structural environments as well as proximal social and economic environments for health and well-being (Elder, 1998; Settersten, 2003). The life course perspective, however, lacks an adequate emphasis on micro-level relationship dynamics, including interindividual and individual-context associations. Bridging these two perspectives combines their strengths and ameliorates their shortcomings while providing an integrated theoretical framework with enhanced explanatory power for couple-focused aging research (Utz, Berg, & Butner, 2016). Furthermore, the combination of the two theories is consistent with studies that have called

for the integration of the life course and systems perspectives when studying the aging outcomes of adults nested within families (Utz et al., 2016). We extend this approach to inform future studies of the aging process for individuals in long-term, enduring couple relationships with the goal of developing theoretical tenets and analytical guidelines for the study of aging processes and outcomes in the couple context. Accordingly, this article has three main objectives: (a) to incorporate the life course and systems perspectives into an integrated life course systems perspective that can advance knowledge of individuals' aging process in the context of enduring couple relationships; (b) to demonstrate how an integrated life course systems perspective can inform hypotheses and to discuss advanced analytical approaches that can be utilized to test those hypotheses; and (c) to recommend future directions to further strengthen the integrated life course systems perspective and enhance knowledge of individuals' aging process.

An Integrated Life Course Systems Perspective

The Life Course Perspective

Consistent with the life course perspective, aging is not limited to a single life stage. Instead, it is a process that unfolds across the life course, characterized by trajectories of continuity and change (Elder & Geile, 2009). Further, the life course perspective contends that later-life experiences are a product of an individual's experiences at previous life stages; that is, life is a continuous chain of events and circumstances influenced by multiple contextual, relational, and individual factors. The theory specifically emphasizes certain factors, including historical place and time, social structure, continuity, and parallel social and developmental pathways, social and close relationships, and personal agency (Elder, 1998; Settersten, 2003; Stowe & Cooney, 2015). These factors influence life experiences in various ways, including the provision of resources, the constraints exerted, and individuals' ability to make their own choices.

Individuals' lives are situated within historical place and time, which influences the aging process because the sociohistorical environment has an impact on available resources and also exerts constraints on individuals' life experiences. For example, the majority of older adults today are members of the baby-boom cohort, named for its large size in comparison to previous generations. The range of resources and constraints experienced vary by cohort. Furthermore, in this cohort, those who lived in the rural Midwest (historical place) and experienced the rural farming crisis of the late 1980s (historical time) experienced particular resources and constraints. Such individuals may have social trajectories (e.g., relational, work, and economic experiences over time) that vary from earlier and later cohorts or even from members of their own cohort who were not located in areas affected by the farm crisis (Conger & Elder, 1994; Lorenz, Elder, Bao, Wickrama, & Conger, 2000). These distinct social trajectories stemming from historical time and place may result in different aging (health and well-being) trajectories.

Like historical place and time, social structure, as marked by characteristics such as social class, race, and gender, also contributes to available resources and constraints, thereby influencing life experiences and exerting a persistent influence on an individual's aging process over the life course. These characteristics are largely ascribed to individuals from

birth, yet they are influential across the life span. For instance, research has shown that characteristics of social class in the family of origin and related early socioeconomic adversities, such as early family economic hardship, influence the health and well-being outcomes of older adults even after accounting for adult life experiences (Moody-Ayers, Lindquist, Sen, & Covinsky, 2007; Wickrama, Mancini, Kwag, & Kwon, 2012).

In conceptualizing how early and accumulating life experiences come to influence later life, the life course perspective recognizes the existence of parallel social and developmental pathways. That is, there are thought to be interconnected, or parallel, trajectories of social circumstances (e.g., stressful experiences) and developmental attributes within an individual. Changes in social circumstances can reflect changes in developmental attributes, and vice versa. In this way, experiences (including cumulative experiences) and development at each life stage are sequentially linked to the next life stage. For example, previous studies have shown that anxiety symptom trajectories are influenced by work insecurity trajectories, reflecting parallel trajectories of changes in work or financial context and mental health (Wickrama, O'Neal, & Lorenz, 2018). Moreover, physical health trajectories of husbands and wives are influenced by marital quality trajectories (Robles, 2014; Wickrama, Lorenz, & Conger, 1997), and trajectories of stressful experiences may be associated with trajectories of physical health risks, as measured by multiple biomarkers of metabolic syndrome, inflammation, and epigenetics indicating level of disease risk or accelerated aging (e.g., Arbeev et al., 2018). Notably, the conceptualized social pathway is not limited to continuous constructs (e.g., marital quality), as it can also consist of discrete events (e.g., children leaving home, retirement). The timing and sequence of such life events and transitions are important characteristics that constitute the social pathway.

A relational component of the life course perspective is the emphasis on social and close relationships. In particular, the life course perspective emphasizes the phenomenon of "linked lives," with the marital relationship being the primary example. That is, partners' daily life activities are intertwined with their life trajectories, and each individual's life trajectories influence his or her partner's trajectories (e.g., stress transfer; Milkie, 2010). Moreover, couples' shared life trajectories represent experiences that are common to both partners, such as family economic hardship (Elder, 1998; Stowe & Cooney, 2015). These mutual influences may operate at least in part through the provision, or lack thereof, of social and emotional resources in the couple's relational context. For example, previous studies have shown that individuals' physical health trajectories are influenced by their partner's physical health trajectories as well as by the couple's shared experiences of economic hardship over time (Cobb et al., 2015; Kiecolt-Glaser & Wilson, 2017; Ledermann & Kenny, 2012; Wickrama, O'Neal, & Nepl, 2019). Such influences are not limited to physical health. Research has provided evidence of similar mutual influences for partners' mental health, such as husbands' and wives' depressive symptom trajectories over the life course (Kiecolt-Glaser & Wilson, 2017; Wickrama, King, O'Neal, & Lorenz, 2019).

Last, although the life course perspective's emphasis on relationships and the broader context is important for examining aging and later-life outcomes in the context of enduring couple relationships, the life course perspective also recognizes that individuals are not solely a product of their context. Individual agency recognizes the influence of

personal choices. Both positive characteristics (e.g., positive affect, mastery, self-regulation, self-esteem) and negative characteristics (e.g., neuroticism, hostility) of individuals play roles in life choices and, in turn, affect continuity and change in an individual's life experiences. Studies have shown that individual choices can shape, and even turn, developmental trajectories. For example, joining the military has been shown to positively turn disadvantaged young adults' developmental trajectories in some instances (Gotlib & Wheaton, 1997). Moreover, early choices related to work, marriage, and parenthood have been shown to negatively influence youth developmental outcomes (Koball et al., 2010; Lee, Wickrama, O'Neal, & Prado, 2018). Later in life, decisions often largely drive changes such as divorce, remarriage, relocation, and timing of retirement that may alter developmental trajectories. These decisions have also been shown to influence older adults' health and well-being trajectories in the context of structural constraints (Settersten, 2003). In the present conceptualization, we consider race/ethnicity and gender together with agency as influential individual characteristics.

In summary, the life course perspective provides a framework for understanding aging processes in the couple context, giving consideration to influences that stem from (a) specific time periods (historical place and time); (b) elements of social structure; (c) intraindividual parallel trajectories of social and developmental trajectories; (d) social and relational factors, including the linked lives of partners; and (e) personal characteristics (e.g., individual agency).

The Systems Perspective and Conceptualizing Relational Systems

Consistent with the systems perspective, relationships can be conceptualized as systems (i.e., an organized whole). The general systems perspective (Von Bertalanffy, 1969) contends that a system is comprised of interconnected, dependent parts that mutually influence one another. More importantly, the constituent parts (i.e., individuals) are influenced by the system (i.e., the relationship), and at the same time, these parts influence the system, effecting changes in the system as a whole. Notably, system characteristics, particularly processes within the system, are not merely the sum of constituent parts but are higher-order properties of the system. In addition, structural, or global, system characteristics (e.g., size, number of parts, composition, duration) can play a role in how the system and its constituents function, interact, and affect one another.

The family systems theory (Broderick, 1993; Cox & Paley, 1997) was derived from the general systems perspective by applying systems principles to the family. Thus, family members are interdependent parts of the family system, in which interindividual influences exist among family members and multilevel influences operate between members and the family system. Because there is variation between families as well as between members in a family, individual variations are decomposed into between and within components (i.e., what varies between families and what varies within families).

A smaller system in many families is the couple system, to which principles of the systems perspective can also be applied. As previously indicated, we consider an enduring couple to be a relatively stable system and a system in which these members have lived the majority of their lives (Bookwala, 2016). That is, particularly in enduring couple relationships, partners

function interdependently and their experiences occur in a context of mutual influences and interactions forming crossover, or partner, effects (e.g., one individual influences his or her partner) and contemporaneous associations between partners (e.g., contagion of “sharing” experiences, emotions, and so on). This conceptualization expands on the life course notion of linked lives by providing a more detailed exploration of relationship dynamics.

Researchers have increasingly focused on the couple as a dyadic system, noting the existence of couple-level characteristics and couple-individual dynamics. Drawing from family systems, each individual contributes to the couple context as reflected by couple-level characteristics. Two examples that reflect couple processes are joint activities between partners (e.g., joint engagement in exercise, cooking, leisure, eating) as a reflection of the couple’s behavioral interaction and shared perceptions of the relationship (e.g., marital satisfaction) as an indicator of marital quality. Another example that likely reflects more structural elements of the system is family economic hardship, to which husbands’ and wives’ economic difficulties both contribute (Lee, Wickrama, & O’Neal, 2019). In further conceptualizing couple-level contexts, each partner’s individual characteristics, such as health, can be utilized to assess longitudinal couple characteristics, such as health synchrony, over time between partners (i.e., the degree to which health trajectories between partners follow the same pattern over time).

As noted earlier, a key tenet of the systems perspective is that the system (i.e., the couple in this instance) can also affect individual members. Couple research notes that couple-level characteristics (e.g., economic hardship, marital quality) are related to individuals’ trajectories of health and well-being. Furthermore, family-focused biopsychosocial research suggests that the family socioeconomic environment may influence relational processes in the family and induce behavioral stress adaptation, which can affect the biological processes of both partners over time (Booth, McHale, & Lansdale, 2011; Papp, Pendry, Simon, & Adam, 2013). Moreover, this adaptation is consistent with the notion of common fate (Ledermann & Kenny, 2012), which posits that couple-level constructs influence the outcomes of both partners. These multilevel processes between the couple system and individual may operate over the life course.

In addition to these multilevel processes, the couple system modifies, adapts, and, more generally, changes over time. When considering the couple system and aging processes over the life course, a particularly salient mechanism for change is self-reorganization (Cox & Paley, 1997). Self-reorganization refers to adaptation that occurs in response to changes in the environment. Some examples of changes in the environment around the couple system, particularly changes in the proximal environment over the life course, include changing relationships with aging parents (e.g., death of parents), increasingly independent children (e.g., children leaving home), and changes in work quality (e.g., change in work schedule) and/or status (e.g., retirement). Different stages of life are associated with specific age-graded roles with varying salience (e.g., rearing children in early midlife, launching adult children in late midlife, becoming grandparents and retirement in later years). Thus, these proximal environmental changes are often dependent on life stage and may influence the characteristics of the couple system. Such changes may prompt reorganization within the couple and changes to the couple system as a whole when partners’ roles change or

when partners acquire new roles. These changes may influence the health and well-being trajectories of both partners.

Integrating the Life Course and Systems Perspectives

Consistent with socioemotional selectivity theory (Carstensen, 1992), older adulthood is typically a stage of self-reflection, when older adults begin to perceive time as limited, which results in the increased importance of satisfying emotional encounters. Social networks tend to shrink to those that provide the most socially rewarding encounters, such as the marital relationship. Thus, when focusing on aging partners in enduring couple relationships, we posit that the couple system is of increasing salience with advancing age. Connecting this concept with the systems perspective, within this enduring couple system, each partner's aging outcomes are closely tied to the partner's outcomes (e.g., partner effects and dependencies) and are influenced by the couple context in which they function (e.g., couple-level characteristics such as family economic hardship). As acknowledged by central tenets of the life course perspective, although later life involves key considerations of aging, including increasing salience of the marital relationship, aging is not limited to a single life stage. Instead, it is a process that unfolds across the life course, characterized by trajectories of continuity and change, and it requires taking a long view while considering the larger social context (e.g., historical time and place, social structure, social relations) (Stowe & Cooney, 2015). That is, partners' interlocking social and developmental or aging trajectories are influenced by the larger socioeconomic context and personal characteristics, and these trajectories unfold within the dynamic couple system over time.

Related Theoretical Perspectives

Ecological Model of Marriage

The proposed life course systems perspective is also informed by several other related theoretical perspectives or models that focus on marriage. First, the ecological perspective (Helms, Supple, & Proulx, 2011; Huston, 2000) contends that marital and parent-child relations are nested within a multilayered ecological context and that family relations and interactions thus cannot be investigated in isolation. The multilayered ecological context includes both macro-socioeconomic context (e.g., sociohistorical context, culture, socioeconomic conditions) and proximal environment (e.g., community, work). These ecological factors shape an individual's ability to sustain his or her marital and/or parent-child relations over time. Furthermore, the ecological perspective contends that individual characteristics (e.g., feelings, attitudes, beliefs) have a direct additive influence on partners' marital behaviors. More importantly, this perspective emphasizes not only the main additive effects of individual characteristics on dyadic relations but also the multiplicative influences among ecological factors and individual characteristics. That is, individual characteristics may intensify or weaken the influence of ecological factors on dyadic relations.

The proposed life course systems perspective accounts for important components of the ecological perspective including multilayered ecological factors, individual characteristics, and dyadic relations. Specifically, we incorporated the element of multiplicative influences (i.e., interactions) of ecological factors and individual characteristics (e.g., individual

agency) in the proposed theoretical framework. However, our proposed theoretical framework extends beyond the ecological models in terms of intraindividual dynamics (e.g., social and developmental pathways) and interindividual dyadic dynamics over the life course. Moreover, unlike ecological models that focus on marriage, the proposed model focuses on both social relationships and aging and health pathways over the life course. The proposed perspective also explicitly defines the couple context as an ecological layer involved in upward and downward influences with constituent members.

The Vulnerability–Stress–Adaptation Model

The vulnerability–stress–adaptation model (VSAM; Karney & Bradbury, 1995) has been extensively used by researchers to analyze changes in the quality of marital relations over time. The VSAM contends that individual characteristics (early individual vulnerabilities and strengths) and stressful life context (stressful events and circumstances) additively and interactively influence marital quality through the couple’s adaptive processes. These dyadic adaptive processes have a reciprocal relationship with the stressful context. In addition, individual vulnerabilities and strengths contribute to a stressful context.

Although the VSAM provides an excellent theoretical framework for studying change in marriage, it has certain limitations, particularly for the study of the aging and health of enduring couples. These limitations largely stem from the fact that the VSAM primarily focuses on marriage. First, although individual background or demographic characteristics, such as parents’ marital status, race/ethnicity, and educational level, are considered influencing factors for personal enduring vulnerabilities (Karney & Bradbury, 1995), distal socioeconomic background (e.g., the sociohistorical context from which spouses come, including immigrant history and circumstances) is not a separate construct in the model. This lack of inclusion may limit examinations of the interaction effect among personal vulnerabilities and distal socioeconomic background factors. The proposed life course systems perspective identifies distal socioeconomic background factors as a separate construct and conceptualizes that construct’s interaction effect with personal enduring vulnerabilities. Similarly, the VSAM does not identify social structural factors (e.g., community socioeconomic adversity, work characteristics) as separate constructs that influence outcomes, which may also limit the model’s ability to examine the interaction among personal vulnerabilities and social structural factors.

Second, the VSAM does not distinguish acute stressors from chronic stressors (Karney & Bradbury, 1995), which may limit the model’s ability to examine the differential influences of acute and chronic stressors, especially when they act in concert with enduring vulnerabilities. Moreover, some social structural conditions (e.g., community and work adversities) may operate as chronic stressors for spouses over the life course. The present life course systems perspective proposes social structural factors as a separate construct and conceptualizes that construct’s interaction with personal vulnerabilities.

Third, the VSAM does not lend itself to considering distinctions between spouses, which is addressed in the proposed life course systems perspective’s conceptualization of spouses’ distinct social and health or aging pathways, which allows for examinations of longitudinal interplay, comorbidity, and synchrony between spouses. More generally, the VSAM is a

useful framework for research that focuses on proximal determinants of marital relations, whereas the proposed framework largely focuses on the consequences of couple experiences (S) for aging or health trajectories (H) while incorporating the proximal stressful context through the consideration of more distal structural and socioeconomic contexts.

The Proposed Theoretical Framework

In summary, the life course systems perspective provides scaffolding for considering intraindividual, interindividual, and individual–context associations (i.e., multilevel associations), as well as the additive and multiplicative influences of external and individual factors longitudinally over the life course. This scaffolding can inform research on relationships and aging across the life course, including the incorporation of predictors and outcomes of continuity and change in relationships during the aging process. That is, an integrated perspective proposes multilevel relational mechanisms that explain partners' aging outcomes in the broader socioeconomic and longitudinal couple context. Thus, bridging the life course and systems perspectives both hierarchically and longitudinally provides a synthesized life course systems perspective with enhanced explanatory power in relation to partners' aging process in the context of their enduring couple relationships. Figure 1 provides a graphical representation of the associations highlighted for consideration within this integrated life course systems perspective, and key elements are described in the paragraphs that follow drawing from panel data available in the Later Adulthood Study (LAS) to inform examples of these elements (see Wickrama et al., 2017 for more on the study, including survey measures). (In the proposed framework and related discussion, heterosexual marriage is used as the template; thus, the terms *husband* and *wife* are employed. However, the model is applicable to other populations. Readers could use the terms *partner* or *spouse* instead.) The key elements follow:

Intraindividual associations capture within-individual dynamic associations over time. These pathways include intraindividual associations among social experiences (e.g., stressful experiences, S) and development over time (e.g., health or aging outcomes, H) with parallel developmental and social pathways (actor effects denoted by continuous S and H pathways in Figure 1). These pathways also include intraindividual associations among different aging outcomes over time (longitudinal comorbidity among aging outcomes signified through contemporaneous correlations (e.g., mental health and physical health depicted by H pathways in Figure 1).

Regarding these intraindividual associations, the contemporaneous influence of social experiences (S) on development outcomes (H) in the longitudinal context may be reflected by parallel intraindividual trajectories of social experiences (e.g., marital quality, economic hardship) and development (e.g., health), with changes in one trajectory corresponding to changes in another trajectory. It is also plausible for mutual influences between intraindividual development and social trajectories (S and H pathways) to produce self-perpetuating life course processes (e.g., accelerating work and health stress). Similarly, the longitudinal comorbidity between two developmental or aging attributes (e.g., depression and loneliness; body mass index, or BMI, and depression) may be reflected by parallel intraindividual trajectories (multiple H pathways) when they demonstrate similar rates of

change (i.e., longitudinal comorbidity), which has been shown to have a synergistic effect on disease outcomes (Ladwig, Marten-Mittag, Löwel, Döring, & Wichmann, 2006; Wickrama et al., 2017).

Interindividual associations capture crossover influences between partners over time (e.g., husband to wife and wife to husband). These pathways include interindividual associations among aging outcomes over time (crossover or contagion signified through individual–partner contemporaneous correlations, such as between H pathways for husbands and wives, and partner effects, P, between husband and wife pathways).

Regarding these interindividual associations, drawing from research on stress crossover between partners, the interdependence between partners in a longitudinal context can be reflected by associations between interindividual trajectories (Westman & Etzion, 1995), for instance, a husband's and wife's parallel developmental trajectories (e.g., BMI trajectories) or social trajectories (e.g., economic hardship trajectories). Moreover, these crossover associations may exist between individuals' trajectories in one domain and their partner's trajectories in a different domain—for instance, parallel trajectories between husbands' development and wives' stressful work, or vice versa. Reciprocal influences between husbands' and wives' trajectories are also possible. Parallel trajectories of an attribute (e.g., BMI) between partners reflects the degree of synchrony between partners, which has been shown to have implications for the subsequent disease outcomes of both partners (Wickrama, Lee, & O'Neal, 2020).

Individual-couple context (multilevel) associations capture the influence of couple context on individuals (downward effect, D) and the influence of individuals on the shared couple context (upward effect, U). Other pathways included in the framework consider

- a. the influence of distal environmental characteristics (e.g., historical place and time) on couples and individuals (R),
- b. the influence of social structure (e.g., social class) and proximal socioeconomic environment (e.g., work conditions and community) on couples and individuals (Z),
- c. the influence of personal characteristics and choices (e.g., mastery, self-regulation, neuroticism, attitudes, race/ethnicity and gender) on individuals (Q), and
- d. The interaction effect of Z and Q as well as R and Q on social and developmental pathways, which addresses the amplification or weakening of the influence of contextual factors by individual characteristics.

In the theoretical model shown in Figure 1, circles represent the couple system with varying stability (or lack thereof) over the life course. The continuities of social attributes (social pathway, S) and health or aging attributes (developmental pathway, H) are depicted by intraindividual curved arrows over time that account for cross-sectional and longitudinal partner effects between partners (paths P). Multilevel influences between each individual and the couple system are also illustrated (paths D and U). Furthermore, downward arrows from the upper box depict structural and historical socioeconomic influences on individuals

and the couple system (direct additive effects, Z and R) of the distal environment and social structure. The upward arrows (paths Q) from the lower box depict the influence of personal characteristics (e.g., individual agency) on the individuals and the couple system (direct effects); upward arrows also notate potential moderating effects of these personal characteristics ($R \times Q$ and $Z \times Q$).

Specific Aging Hypotheses Derived From the Life Course Systems Perspective

Our purpose in this section is to provide examples of testable hypotheses and models that can be derived from this life course systems perspective with an emphasis on better understanding aging in the context of enduring relationships. Again drawing from the LAS panel data (see Wickrama et al., 2017, for more on the study, including survey measures), we conceptualize a repeated measure of physical functioning (PF) as a valid indicator for aging, where PF can be captured from a physical impairment scale noting the range of impairment for vigorous and moderate activities (e.g., running and carrying groceries, respectively; RAND 36-Item Health Survey 1.0; Hays, Sherbourne, & Mazel, 1993). We conceptualize a repeated measure of experiences of economic hardship (EH) as an example of a social experience influenced by social structure (stressful marital relations would be another example) with implications for partners in enduring couple relationships, where EH can be captured by summing yes responses to various items representing financial constraints and cutbacks (e.g., difficulty making ends meet, having a phone disconnected). Both PF and EH are continuous composite measures. Sample hypotheses, which are not intended to be exhaustive of all possibilities, capturing the aging process include the following:

Hypothesis A: The level and change in individuals' EH is related to the level and change in their own PF over the life course. *This hypothesis examines an intraindividual influence, namely, a longitudinal actor effect.* (The covariate predicting the level and change in PF can also be time invariant, e.g., early EH).

Hypothesis B: The level and change in individuals' EH is related to the level and change in their partners' PF over the life course. *This hypothesis examines an interindividual influence, namely, a longitudinal partner effect.* (The individuals' covariate predicting the level and change in partners' PF can also be time invariant, e.g., their partner's personality).

Hypothesis C: PF is contemporaneously associated (i.e., correlated) between partners. *This hypothesis examines interindividual contemporaneous associations and/or longitudinal concordance. Similar contemporaneous associations may be hypothesized for EH.*

Hypothesis D: There exists a couple-level construct of EH (i.e., couple EH). The level and change in couples' EH is related to the level and change in each individual's PF over the life course. *This hypothesis examines a downward contextual influence indicating how the couple system influences its constituents (i.e., partners).*

Hypothesis E: Proximal socioeconomic context (e.g., work quality) influences both EH and PF pathways (as depicted by Z in Figure 1).

Hypothesis F: Individuals' sense of mastery (reflecting agency) influences both EH and PF pathways (as depicted by Q in Figure 1).

Hypothesis G: Proximal socioeconomic context (e.g., work quality) and sense of mastery interact to influence both EH and PF pathways (as depicted by $Z \times Q$ in Figure 1).

Advanced Approaches for Testing Hypotheses in the Couple Context

There are various methodological approaches, both quantitative and qualitative, available to test these example hypotheses. Given the goal of presenting multiple quantitative analytical approaches in extensive detail, space limitations, unfortunately, do not allow for a discussion of qualitative approaches to testing the hypotheses. The quantitative approach best suited to address the research hypotheses depends on the availability of data and the type of change process of interest (e.g., residual change, absolute change). We provide an overview of two broad methodological approaches and their extensions that are particularly well suited to the study of the aging process in the longitudinal context of enduring couple relationships. We emphasize techniques developed and enhanced relatively recently. The two broad approaches are cross-lagged autoregressive modeling and latent growth curve modeling. We review and discuss the assumptions, applicability, strengths, and limitations of each of these approaches.

A Cross-Lagged Autoregressive Approach

Cross-lagged autoregressive (CL-AR) modeling (Jöreskog, 1970) is a useful tool for family gerontologists who investigate time-sequential processes of couple aging over the life course. Figure 2 presents a simple CL-AR model detailing cross-lagged and contemporaneous associations, which is also referred to as an intraindividual cross-lagged contemporaneous model. This model assesses a hypothesis connecting the PF and EH of an individual across two occasions. In Figure 2, autoregression refers to regressing one variable on its lagged score (or previous measurement of the same construct), for example, regressing PF2 on PF1 or EH2 on EH1. This is an example of Hypothesis A and is denoted by the parallel lines between S and H in Figure 1). In addition to traditional regression assumptions, it is assumed that repeated measures of the same construct measure the same attribute across occasions (i.e., time invariance) and that the relationship between variables is linear. The regression coefficients b_1 and b_4 can be interpreted as the extent to which the value of an attribute at one time point predicts the value of the same attribute at the later point in time (e.g., how PF1 predicts or explains variation in PF2). These effects (b_1 and b_4) describe the stability of individual differences over time or the degree of "reshuffling" in the rank order of individuals (i.e., rank-order stability of PF and EH). Small b_1 and b_4 coefficients suggest low stability in the rank order over time. Furthermore, the model depicts that EH1 predicts PF2 after controlling for the effect of PF1 (b_3). The model also includes a similar cross-lagged effect testing the influence of PF1 on EH2 (b_2) (Hypothesis A and denoted by the parallel lines in Figure 1). Importantly, the strength of these cross-lagged effects (b_2 and b_3) depends on the strength of the stabilities (b_1 and b_4). For a more detailed discussion on how cross-lagged effects in CL-AR models are influenced by correlations

among the four variables comprising the model, see Lorenz, Conger, Simons, and Whitbeck (1995).

Even with longitudinal data, cross-lagged effects (b_2 and b_3) do not firmly establish the causal order of attributes because data come from a passive design rather than a design in which predictors are experimentally manipulated. However, if the CL-AR model is based on a strong theory and a proper temporal design (e.g., appropriate time lags between measurement occasions), the model can provide some evidence for the causal order. Importantly, this approach allows for an examination of the relative strength of the mutual influences of these attributes on each other (e.g., b_2 and b_3) (Kearney, 2016). The primary weakness of a CL-AR model is that it is not sensitive to intra- or within-individual changes over time. Furthermore, when a construct has high stability over time, it is impossible to predict residual change in the construct even when there is some degree of absolute change.

Figure 2 also presents an extended CL-AR model with three time points. For instance, this example model includes measures of PF and EH at three occasions: early midlife, middle midlife, and later life (where early midlife overlaps with the aftermath of rural farm crisis). It is also possible to incorporate direct paths from Time 1 to Time 3, representing the delayed influence of early experiences on later outcomes. An advantage of this approach is that researchers can examine whether the effect between PF and EH is stable. For example, this model allows for researchers to test whether associations between EH1 and PH2 are similar in magnitude to the associations between EH2 and PH3.

Figure 2 further extends this CL-AR approach to incorporate interindividual influences (Hypothesis B), adding data from partners rather than relying solely on data from one individual. Regarding the incorporation of partner data, this model considers intraindividual associations for husbands and wives while simultaneously assessing possible spousal crossover (i.e., partner effects between couple members, Hypotheses B and C noted as P in Figure 1), for example, the influence of husbands' PF1 on wives' PF2 and vice versa, or, similarly, the influence of husbands' EH1 on wives' PF2 and vice versa.

The inclusion of data from both partners also allows researchers to examine whether these processes have a similar magnitude over time, which is known as the dyadic invariance assumption (Peugh, DiLillo, & Panuzio, 2013). For example, two of the more common constraint patterns with distinguishable dyad members (e.g., husband and wife) involve a model that constrains husbands' and wives' intraindividual processes to be equal and/or interindividual processes to be equal. These equality assumptions allow for investigations of whether inter- and intraindividual processes are significantly different between husbands and wives.

When the dyadic model contains repeated measures with more than two occasions, the dyadic invariance assumption becomes more complex and allows for an investigation of whether intra- and interindividual processes are similar in magnitude between dyad members and across time. This assumption is known as the longitudinal dyadic invariance assumption (Whittaker, Beretvas, & Falbo, 2014). For example, researchers can test whether intraindividual processes are equal over time and between dyad members (e.g., $b^{(HH)}_{21}$

$= b^{(HH)}_{32} = b^{(WW)}_{21} = b^{(WW)}_{32}$ in Figure 4, presented in more detail below). In the same manner, researchers can test whether interindividual processes are equal over time and between dyad members (e.g., $b^{(WH)}_{21} = b^{(WH)}_{32} = b^{(HW)}_{21} = b^{(HW)}_{32}$; see Figure 4). Although two invariance assumptions (across time and dyadic members) can be tested simultaneously, they could also be tested consecutively (i.e., longitudinally followed by dyadic invariance or vice versa; Whittaker et al., 2014).

Figure 3 presents an extension of the CL-AR approach with couple-level constructs (Hypothesis D). Here, the couple context of EH is defined using a latent construct derived from the husband's and wife's EH measures. Incorporating the couple context in this manner allows for an assessment of hypotheses related to couple-level continuity over time (Hypothesis D and noted as D and U in Figure 1). In addition to intra- and interindividual associations, this model includes multilevel associations between each partner and the couple context. In sum, this model can be utilized to locate couple dynamics within a life course context with a long view. To test Hypotheses E–G, it is possible to add variables capturing the socioeconomic context, structural characteristics, and/or personal characteristics and their interactions for incorporation into the models shown in Figures 2 and 3 to predict EH and PF constructs.

A Random-Intercept Extension of the CL-AR Approach (RI-CL-AR)

The CL-AR models allow researchers to examine dynamic processes (Hypotheses A and B) related to couple aging over time. However, longitudinal data can also be considered a form of multilevel data in which measurement occasions are nested within individuals. Following this conceptualization, it is possible, and perhaps preferable in some instances, to separate within-person (within-level) variability from *between*-person (between-level) variability, which can be accomplished using the random-intercept CL-AR (RI-CL-AR) model proposed by Hamaker, Kuiper, and Grasman (2015). A minimum of three measurement waves is required (Hamaker et al., 2015). An example is shown in Figure 4, where random-intercept latent variables are defined for husbands' and wives' PF. Because these random-intercept factors are simply added to a standard CL-AR, the CL-AR is statistically nested within the RI-CL-AR. The inclusion of a random-intercept factor accounts for the time-invariant, traitlike stability of the given attribute within each individual across measurement occasions (Berry & Willoughby, 2017). In this example, the random-intercept variable for husbands' PF estimates the average intercept of husbands' PF considering each time point (T1, T2, and T3). The mean of this random-intercept variable represents the estimated average PF for husbands across the sample, and the variance of this variable represents the between-person variability in average PF for husbands. Using this type of model in a structural equation modeling (SEM) framework allows researchers to examine the between-person association of husbands' and wives' PF by specifying a covariance between their random intercept constructs (see the double-arrowed line in Figure 4).

After accounting for between-person processes, observed indicators have specific residuals at each time point. At a given time, the residual represents the individual's deviation from his or her own average (i.e., within-person variability) (e.g., Hoffman, 2015). In an SEM,

these residuals can be estimated as another set of latent variables. For example, Figure 4 shows six latent variables representing the residuals of husbands' and wives' PF at Times 1, 2, and 3. These latent variables estimate time-specific residuals of husbands' and wives' PF, indicating within-person variations in their PF. These residuals can be used in the RI-CL-AR model to examine cross-lagged autoregressive associations in PF between husbands and wives.

In the RI-CL-AR example shown in Figure 4, the contemporaneous correlation in PF between husbands and wives (noted as path c) reflects the association between husbands' and wives' within-person deviations in PF. The autoregressive paths between the residuals can be interpreted similarly to the paths in the traditional CL-AR model for actor and partner effects. An example actor path among these residuals is the path from husbands' Time 1 residual to husbands' Time 2 residual (labeled $b^{(HH)}_{21}$). Similarly, an example partner path among the residuals is the path from husbands' Time 1 residual to wives' Time 2 residual (labeled $b^{(WH)}_{21}$). Here, the associations involve only within-person deviations of PF, which means that the parameters reflect intra- and interindividual processes with time-specific deviation scores (i.e., residual scores) after accounting for the time-invariant, traitlike stability component of each individual across the time span investigated.

A Latent Growth Curve Modeling Approach

Latent growth curve modeling (LGC; Meredith & Tisak, 1990) is another analysis approach that can prove useful for testing Hypotheses A, B, and C involving time-varying attributes. Panel a of Figure 5 presents a model with two LGCs created from three repeated measures of PF and EH for an individual with latent variables calculated from the repeated measures to indicate the initial level (I) and slope (S), or rate of change. At the conceptual level, growth curve modeling in an SEM framework can be considered a two-stage process. At the first stage, the goal is to describe change in construct(s) over time for each individual in the study. Conceptually, a regression line with an intercept and slope(s) (i.e., a growth curve) is estimated to plot each individual's change over time for the construct of interest (capturing intraindividual change). In the example in Figure 5, LGCs are shown for PF and EH. At the second stage, individual-specific intercepts and slopes are estimated as latent constructs with a mean and a variance, where the mean of the intercept represents the average of the variable of interest at the first time point and the mean slope represents the average rate of change over time. The variance calculations identify the interindividual differences in these initial level and slope factors.

Assuming that there is sufficient variation in the growth parameters (indicated by statistically significant variance statistics for the intercept and/or slope), theoretically driven covariates, or predictors, can then be incorporated into the LGC to explain the variation in initial levels (intercepts) and slopes among individuals. For example, using time-invariant covariates (e.g., mastery), this type of model could identify why the initial level of PF is higher for some individuals than others and/or why the rate of change in PF is steeper for some individuals than others. Thus, in addition to the simple description of change, LGC allows for the systematic explanation of interindividual differences in both the level and the change of study constructs such as PF and/or EH. Furthermore, this LGC approach

estimates residuals for each time point (unexplained by the systematic growth), which can also be used to estimate residual change over time using external factors.

As shown in Figure 5, the predictors can be growth parameters of another time-varying variable, which is the case when parallel growth curves are modeled in an SEM framework (Hypothesis A). In this example, with growth curves for PF and EH, the level and slope of EH are shown to predict the level and slope of PF, respectively (Hypothesis A, noted by the parallel lines between S and H in Figure 1). In addition, consistent with the cumulative disadvantage notion, within an individual, the level of early EH also can predict the slope of PF (Hypothesis A, not shown in Figure 1). Alternatively, as also shown in Figure 5, associations between growth curves' parameters of both partners' PF or EH can be modeled simultaneously to assess partner effects (Hypothesis B, noted as P in Figure 1).

With the LGCM approach, it is also possible to incorporate a growth curve for the time-varying couple context (e.g., couple EH). Figure 5 shows that the growth parameters of couple EH can be defined as second-order growth parameters (i.e., a factor-of-curves model) using growth parameters of both partners' EH (Wickrama, Lee, O'Neal, & Lorenz, 2016). This analysis produces a comprehensive multilevel model of (a) intraindividual associations (e.g., associations in growth factors between husbands' EH and PF, or Hypothesis A), (b) interindividual associations (e.g., associations in growth factors between husbands' EH and wives' PF, or Hypothesis B), and (c) couple contextual associations (e.g., associations in growth factors between the couple-level slope of EP and each partner's level and slope of PF, or Hypothesis D).

This LGCM approach to investigating aging processes has three clear advantages over the CL-AR approach. First, although CL-AR models can incorporate more than two time points, they can only consider change in two repeated measurements of a variable at a time, which means that systematic growth patterns over time cannot be assessed. That is, changes across all three time points are not considered in relation to one another in a comprehensive and systematic manner, thereby largely failing to conceptualize time as an ongoing process (Coyne & Downey, 1991). This assumption is particularly problematic when change follows a nonlinear trajectory (Willet & Sayer, 1994). Consequently, a growth curve approach might be more appropriate for examining systematic patterns of change in constructs over time.

A second strength of LGCM relates to the inability of CL-AR models to estimate intraindividual change and explain its variation. For example, a slope parameter of PF in a growth curve captures the intraindividual change in PF with a mean and a variance statistic. As shown in Figure 4, this PF slope variance can be explained by EH growth parameters (i.e., intercept and slope). Unlike a CL-AR model, LGCM is not constrained by the stability of PF over time. At the same time, the PF-level parameter captures interindividual differences (i.e., rank order) in PF with a mean and variance statistic. This level variance of PF can also be explained by the level parameter of EH. That is, to understand and comprehensively investigate the aging process in couples (e.g., physical limitations, psychological symptoms, behaviors), it is important to account for multiple facets of change. The level and rate of change (slope) capture elements of a multifaceted process of aging, namely, the intensity or severity (level) and the amount of growth or

decline (rate of change, or slope). The CL-AR approach is not sensitive enough to capture, or distinguish, distinct courses of aging characteristics (i.e., physical limitations), although these courses may have particular antecedents and/or consequences.

Third, distinct courses of aging (as evidenced by the level and change growth parameters) may predict key outcomes, such as the onset of severe health problems. It is important to understand the relative contributions of different growth parameters of an attribute (e.g., level and rate of change) to an outcome (e.g., a specific disease of interest). For example, the level and change in day-to-day memory failure may independently predict the onset of dementia in later years. Using a CL-AR approach, only the level of an attribute (or attributes) can be used to predict subsequent aging outcomes.

Furthermore, a latent change score (LCS) approach can also be used to estimate latent growth curve models. In these models, in addition to modeling the constant change traditional LGCMs estimate (systematic change or maturation), proportional change can also be specified and estimated. Proportional change is the change attributed to a lagged outcome variable, whereas systematic change unfolds over time. For specifics on LCS growth curves, refer to Grimm, Ram, and Estabrook (2017).

Combining LGCM and CL-AR Approaches

With an SEM approach, LGCM and CL-AR models can be combined to examine dynamic processes of changes among repeated measures. We describe two specific approaches: an autoregressive latent trajectory with structured residuals (ALT-SR) approach and a latent change score approach.

An autoregressive latent trajectory with structured residuals approach.—An example of the ALT-SR approach (Berry & Willoughby, 2017; Curran, Howard, Bainter, Lane, & McGinley, 2014) is shown in Figure 6. By disaggregating the two levels of inference (within-person processes and between-person processes), the ALT-SR latent factors are modeled to simultaneously estimate between-person variations in trajectories and within-person, dynamic CL-AR associations. This extension can be used to test Hypotheses B and C in a comprehensive manner that considers both growth factors and residuals.

As in a traditional LGCM, an ALT-SR model estimates two components of change using repeated measures of PF for both husbands and wives: (a) initial level and (b) slope. Variances of the latent growth variables are estimated and represent between-person variations in trajectories. Longitudinal associations between husbands' and wives' PF can be estimated by specifying covariances among growth factors (see gray double arrows in Figure 6). These associations represent between-person processes in couple PF change over time. In addition, traditional CL-AR associations can be specified in this model using time-specific latent residual variables. These CL-AR associations are analogous to those in the RI-CL-AR model described in the previous section, where all CL-AR associations are estimated based on within-person deviations in husbands' and wives' PF.

RI-CL-AR and ALT-SR models are similar in that both approaches simultaneously estimate between-person and within-person processes. However, there are some important differences

in the processes. Regarding between-person processes, the intercept latent factors of ALT-SR are different from the random intercept factors of RI-CL-AR. In an RI-CL-AR model, random-intercept factors estimate the time-invariant, traitlike stability of outcomes (i.e., estimated average scores of husbands' or wives' PF across Times 1, 2, and 3). In an ALT-SR model, intercept factors indicate estimated scores of PF at Time 1 (or at any specified time). In addition, the estimation of within-person CL-AR processes also differs across the models. ALT-SR models estimate CL-AR associations on the basis of the time-specific deviation from the individual's trajectory (residual scores after accounting for the initial levels and slopes of PF). In contrast, RI-CL-AR models estimate CL-AR associations based on time-specific deviations from the individual's averages (residual scores after accounting for the average of PF across Times 1, 2, and 3).

The question of whether to include latent variables for examining between-person processes can be addressed empirically by comparing model fit across models with and without random intercepts and slopes and by comparing direct tests (i.e., likelihood ratio tests) of whether the latent variances are statistically significant. If a model with a slope fits the data substantially better than a model without a slope does, then substantive interpretations of the model with the slope fit are likely more valid (Ehm, Hasselhorn, & Schmiedek, 2019). Theoretical justifications should accompany such empirical considerations.

A latent change score approach (LCS).—The LCS approach (Hamagami & McArdle, 2007) is shown in Supplemental Figure 1. In LCS models, cross-lagged effects between dyad members involving scores can be examined after incorporating both constant and proportional change into the model. External predictors can also be included, as in ALT-SR models (Jajodia, 2012). Based on a true score model, an LCS model operates on true scores of PFs (i.e., latent variables, L-PF1 to L-PF3) by separating true scores from measurement errors. In an LCS model, this true score of PF can be used to express the state of PF at a given time (e.g., L-PF2) as a function of its previous state (e.g., L-PF1) and the true change scores of PF between two successive measurement occasions (e.g., PF1-2), which are estimated as latent change scores.

These latent change scores (e.g., PF1-1, PF1-2, PF1-3 ...) can then be used to estimate two dynamic processes (within-person and between-person processes) of PF: (a) constant change of PF across two successive time points (Time Points 1–2, Time Points 2–3 ...) and (b) proportional change of PF between successive time points. Using repeated latent change scores, a constant changes model estimates two components of changes: initial level and slope (see L and G in Supplemental Figure 1), corresponding to the level and slope growth factors in traditional LGCM. The variances of these growth factors represent between-person variations in trajectories. In addition, proportional change of PF can be modeled by specifying regression paths between true scores of PF (e.g., L-PF1) and latent change scores PF1-2 (see π coefficients in Supplemental Figure 1). These proportional change coefficients represent each individual's change in PF across two successive time points proportional to his or her previous true state (e.g., change between L-PF1 and L-PF2—denoted as PF1-2—is influenced by L-PF1). Typically, these coefficients can be constrained to be equal over time. In this example of PF, constant change and proportional change processes can be estimated simultaneously in a dual change model (see

Supplemental Figure 1). A researcher can select the optimal change model through model comparison tests (e.g., Bayesian information criterion values, likelihood ratio tests).

This dual change model of PF can be extended to the dyadic latent change score model (see Supplemental Figure 2). This dyadic latent change score model accounts for the dynamic processes of change between dyad members (e.g., interdependent associations in change scores of PF between husbands and wives). In the same manner as an ALT-SR model, longitudinal associations between husbands' and wives' PF across time can be estimated by specifying covariances among growth factors. In addition, CL-AR associations can be specified in the dyadic latent change score model using coupling effect regression paths (see γ_1 and γ_2 coefficients in Supplemental Figure 2). These coupling coefficients are useful for family researchers examining how an individual's prior true status predicts subsequent changes (e.g., an individual's prior true status of PF predicting changes in his or her partner's PF).

For testing some hypotheses, this LCS approach is thought to be an improvement over LGCM. With an LCS model, in addition to constant change (G), proportional change (the change component proportional to the previous state) is also estimated. The estimation of these two components of change may be important for family gerontology research. For instance, using the current example, the constant change component may correspond to persistent change in PF due to maturation, and the proportional change component may correspond to incremental deterioration due to the severity of PF. In addition, a dyadic LCS model allows for the estimation of cross-lagged paths between spouses, which is not possible in a traditional LGCM.

Growth Mixture Model Extensions of LGCM

The previously discussed models (e.g., CL-AR, RI-CL-AR, LGCM, ALT-SR, LCS) are all variable centered, meaning that they assume all individuals (or trajectories) are drawn from a single population for which a single set of "averaged" parameters can be estimated. However, this assumption may be inaccurate when the sample comprises multiple unknown subpopulations of trajectories (i.e., population heterogeneity), because each subpopulation may be best characterized by a different set of parameters. For example, some individuals may show high and decreasing PF trajectories, whereas another subgroup of individuals may exhibit low and increasing PF trajectories over time.

A person-centered approach can be utilized to identify subpopulations of similar individuals using latent class variables in an SEM framework (Wickrama et al., 2016). These latent class models are often referred to as finite growth mixture models (GMMs). With this analytical approach, trajectory class membership is not known but is inferred from the data on the basis of posterior class membership probability (Muthén, 2004). The antecedents and consequences of the identified subgroups of individuals can be examined. Subgroups can be identified at the individual level (e.g., groups of husbands) or the couple level (groups of couples), which can be particularly useful for dyadic analysis of couples in enduring relationships.

Parallel process growth mixture model (PP-GMM).—One specific type of couple-level GMM that can identify similar groups of couples with the same dyadic trajectory pattern is a parallel process growth mixture model (PP-GMM). A PP-GMM provides a test of Hypothesis C regarding the contemporaneous association in PF between partners by identifying groups of similar couples. A hypothesized path diagram for this model within a latent growth curve framework is shown in Figure 7. As shown, husbands' and wives' PF trajectories can be specified as factors of a latent grouping variable, $C (= 1, 2, 3, \dots, K)$. In this model, all growth parameters of husbands and wives (i.e., the initial levels and slopes for husband and wife trajectories of PF) are modeled as simultaneous contributors to the empirical identification of couple-level latent classes with similar patterns of PF trajectories. This model identifies distinct patterns of longitudinal changes in couple PF, thereby enabling researchers to examine couples' longitudinal comorbidity of PF. For family science research, the identification of co-occurring attributes in the couple context is important for understanding mutual influences and dependencies across partners.

After identifying unobserved subgroups of couples' PF trajectories with distinct patterns, covariates can be specified into the PP-GMM. For instance, following previous research noting that early couple-level financial strain can have long-term effects on couple-level financial strain in later adulthood through PF (Lee et al., 2019), Figure 7 demonstrates a model specifying family-level EH as a concurrent event (i.e., predictor) and consequence (i.e., outcome) of couple-level classes of FP. Another example is a recent study that identified groups of couples with similar dyadic patterns of marital trajectories over 25 years, including socioeconomic background characteristics as predictors of these trajectories and later mental and physical health as consequences of those trajectories (Wickrama, Klopach, & O'Neal, 2020). In an SEM framework, there are multiple stepwise approaches for specifying predictors and outcomes (e.g., one- and three-step approaches) in a mixture model. Detailed descriptions of these stepwise approaches can be found in Wickrama et al. (2016).

Latent transition growth mixture modeling (LT-GMM).—Another extension of GMM that can be helpful for investigating complex couple aging processes is latent transition growth mixture modeling (LT-GMM). LT-GMM allows researchers to investigate transition patterns (or discontinuous trajectories) over time (Lee, Wickrama, Kwon, Lorenz, & Oshri, 2017). One example is conjoint class trajectories between husbands' and wives' PF (shown in Figure 7). For example, a PP-GMM can identify couples' conjoint class trajectories of PF from midlife to later adulthood, but a PP-GMM also assumes that the subgroups are fixed. That is, developmental continuity is assumed, with subgroup members expected to follow the same growth trajectory across times (i.e., from midlife to later adulthood). However, classification of couple PF trajectories may change depending on couples' life experiences and their responses to life transitions (e.g., timing of retirement or relocation), which suggests developmental discontinuity in couples' PF trajectories during the transition period from midlife to later adulthood. This scenario is consistent with Hypothesis E, signifying the influence of proximal contexts, including the retirement context, and thus, a PP-GMM may not be appropriate. Instead, as shown in Figure 7, a LT-GMM specifies two separate latent classes in the model: (a) classes for couple PF

trajectories in midlife and (b) classes for couple PF trajectories in later adulthood. An LT-GMM also estimates transition probabilities from classes of PF trajectories in midlife to classes of PF trajectories in later adulthood, which allows for a comparison of movers and stayers. Movers are those couples who transition from one class to another across time. Stayers are those who remain in the same class across time. With this comparative capability, life transition experiences, such as early retirement, can be specified as predictors or outcomes of these transition patterns.

Future Directions

We sought in this article to derive testable hypotheses and demonstrate analytical methodologies that can advance research on aging processes in the context of couple relationships. In completing this, directions for future research in the area of couple aging are evident. We highlight two specific areas: (a) incorporating psychosocial, behavioral, and biological processes and (b) incorporating recent advances in studies of couple dynamics into the life course systems perspective.

Incorporating Psychosocial, Behavioral, and Biological Processes

The study of family gerontology can be advanced considerably by conceptualizing stress as a process that is encountered over the life course. For instance, stressors stemming from socioeconomic adversity may multiply and accumulate through various stress processes, including stress proliferation, stress accumulation, and stress potentiation (Pearlin, Schieman, Fazio, & Meersman, 2005). According to past research, stressors stemming from earlier socioeconomic contexts and, relatedly, social class may proliferate in the socioeconomic domain as well as across other domains, and the accumulation of stressors can exert particular influences on individuals (Elder & Geile, 2009; Pearlin et al., 2005). Furthermore, individuals' exposure to stressors early in life may increase their vulnerability to stressful life experiences later in life (stress potentiation) (Dich et al., 2015). The elucidation of these stress processes in the life course systems perspective will enhance understanding of the formation and continuation of chains of stressful circumstances.

One way these chains may exist is through psychosocial and cognitive mechanisms that connect stress exposure to aging outcomes. Consistent with the life course systems perspective, partners' stressful life experiences may stem in part from issues in the larger context (e.g., early and proximal socioeconomic environment) and may continue as stressful social pathways within the couple system, with detrimental consequences for health and aging outcomes. For instance, recent research has focused on psychological schema, including hostility and negative and positive affect as mediating constructs connecting stressful experiences and health outcomes (Gibbons et al., 2014; Luecken & Roubinov, 2012; Wickrama, Lee, Klopach, & Wickrama, 2019). The identification of these types of modifiable micromechanisms would inform health promotion policies and programs for aging couples.

In addition to psychosocial and cognitive mechanisms, there is also a need to consider behavioral processes such as an unhealthy lifestyle, which may represent a proximal health risk. An unhealthy lifestyle can refer to multiple risk behaviors, such as lack of exercise,

poor diet, and smoking. Engaging in an unhealthy lifestyle has been shown to result in cumulative physiological dysregulation and elevated disease risk, as reflected by biomarkers of allostatic load and inflammation (Lee, Wickrama, & O'Neal, 2018). In particular, the timing of chronic disease onset is a determining factor of accelerated biological aging (Maggio, Guralnik, Longo, & Ferrucci, 2006; Pischon et al., 2008). Although health behaviors and aging have been researched to some extent, less research has situated these behaviors and their aging consequences within the life course systems perspective. Research has shown that partners' shared unhealthy lifestyle has an impact on their aging process (Umberson, Williams, Powers, Liu, & Needham, 2006). Thus, incorporating constructs that capture health behavior for research rooted in the life course systems perspective would enhance understanding of partners' accelerated aging.

In recent years, aging research has increasingly focused on the degree of biological system dysregulation (often referred to as biological aging, early disease risk, or accelerated aging). Beyond the behavioral pathways, the dysregulation of biological systems may also reflect chronic direct exposure to stressors, including a stressful socioeconomic context ("weathering"; Geronimus, Hicken, Keene, & Bound, 2006). That is, research suggests that the effects of stress can occur at a more basic, almost cellular level with notable consequences for later health. These health consequences often go undetected until they reach a threshold that results in disease onset. Biological aging can be assessed by various molecular markers, including epigenetic, inflammatory, and metabolic syndrome markers (Maggio et al., 2006; Pischon et al., 2008; Xia, Chen, McDermott, & Han, 2017). The incorporation of markers of biological aging or accelerated aging into the life course systems perspective would enhance our understanding of the influences of chronic stressful environments on the aging process.

Furthermore, research is needed to evaluate more extensively the interconnections among behavior, cognition, and psychosocial mechanisms. As one example, with advancing age, partners often become increasingly dependent on each other for a variety of needs from basic activities of daily living (e.g., dressing, meal preparation) to social interaction and stimulating conversation. As such, caregiving can be physically, mentally, and emotionally demanding (Godfrey et al., 2018). More comprehensive research can examine how these caregiving trajectories relate to previous life experiences and influence the health and relational outcomes of both couple members. In turn, research can identify how these health impacts of caregiving vary depending on individual and couple characteristics as well as surrounding context and available resources. Moreover, in identifying key transitions of the later life course, the transition to "caregiver" and "one being cared for" is a sizable change with implications that ripple throughout the couple and family. Not only would this knowledge in a long-term context advance our understanding of aging in the couple context, it would also provide clear implications for programs and policies by identifying which resources (both distal and proximal, structural and relational) are most strongly connected to caregiver well-being and position programs to exert the maximum impact on supporting couples in later life.

Incorporating Recent Advances in the Study of Couple Dynamics

Less is known about partner–partner health risk resemblance in a longitudinal context and its health consequences for each partner. That is, although individuals can have distinct health risk trajectories, these trajectories are interrelated for many partners and may combine to influence health outcomes. More recently, aging research has focused on this comorbidity of health or aging outcomes between spouses (i.e., “lovesick”; Kiecolt-Glaser & Wilson, 2017). For partners in enduring couple relationships, longitudinal comorbidity or synchrony of health risks (e.g., trajectories of husbands’ and wives’ BMI) has been shown to amplify the health risk of both partners (Wickrama, Lee, & O’Neal, 2020). Furthermore, synchronized health risk trajectories may exist within individuals (e.g., individuals’ trajectories of BMI and depressive symptoms), and there is evidence that these synergies explain more variation in health risks than examinations of individual risk trajectories (Wickrama et al., 2017). Thus, examining partners’ health risk trajectories simultaneously within the life course systems perspective can shed light on the joint influences of partners’ health risk trajectories on their health outcomes.

Within the study of couple dynamics, analytical advances have increasingly demonstrated that there is no single health risk trajectory for couples. Instead, there are likely homogeneous groups of couples whose members share similar trajectory patterns, and these patterns may vary significantly among groups of couples. This couple clustering may be attributed to underlying social processes stemming from their socioeconomic background, including early and distal socioeconomic factors, social class, and race/ethnicity. Thus, within a dyadic longitudinal context, health risk trajectory patterns are influenced and stratified by couples’ socioeconomic background, and these couple trajectory patterns are expected to exert differential influences on partners’ aging outcomes. Utilizing analytic approaches such as growth mixture modeling that are sensitive to the potential underlying groups of homogeneous couples (i.e., unobserved heterogeneity) will further identify how the aging process of couples can be socially stratified.

Beyond Traditional Marriage

We recognize that the focus in this article on enduring couples and the utilization of panel data from husbands and wives available in the Later Adulthood Study for conceptualizing hypotheses and analyses could be seen as a limitation in applying the perspective to other populations. However, there are two primary reasons the perspective could prove fruitful in research with more diverse couples (e.g., same-sex couples, couples with racial/ethnic diversity, cohabiting couples, remarried couples who are less established). First, the domains and experiences (e.g., social trajectories, socioeconomic factors) encompassing this life course systems perspective are relatively global experiences and occur in large part across populations. As an example, economic hardship is a relatively universal stressor that is not specific to a single population, although economic hardship can certainly be greater for certain populations (which the perspective captures as $R \times Q$ and $Journal\ of\ Marriage\ and\ Family.\ Z \times Q$ interactions). Second, although purposefully broad in nature, the perspective was also created to enable flexibility by distinguishing constructs at a macro level (e.g., socioeconomic factors), which encourages researchers to focus on specific characteristics of these constructs that are most salient to the study population and focus. For instance,

discrimination can be conceptualized as a characteristic of social structure (Z), and research on racial/ethnic minority couples that addresses discrimination or health inequality as elements of social structure (Z) with implications for couple context and aging (S and H) is poised to advance the field of family gerontology. In this manner, this life course systems perspective provides a theoretical scaffold to inform the work of family gerontologists and proposes quantitative methods that may fit well with the identified research hypotheses without being overly prescriptive.

A related point we acknowledge is the changing landscape of later-life relationships. One change is the rising number of divorces in the second half of life (known as the “gray divorce revolution”) (Brown & Lin, 2012). Of the analytical approaches identified, transition analyses may be most appropriate for studies of gray divorces. Cohabitation has also become more prevalent and accepted in the general population, including for older adults (particularly given that older adults may see structural and relational disadvantages of legal marriage, such as loss of benefits connected to a former spouse or simply a desire to maintain independence). This changing demographic for later adults can have implications for the salience of the pathways proposed in the life course systems perspective. For instance, couple-level constructs, such as couple-level stress, may be less salient for cohabiting couples. However, it is also plausible that the salience for couple-level constructs depends on the reason for cohabitation, and the more determining factor of the salience of couple-level factors may be couple connectedness or closeness rather than technical marital status. In contrast, couple-level constructs, such as couple stress, may be more salient for same-sex couples and racial/ethnic minority couples because of shared experiences of discrimination. These are important areas for examination in future research. Although the life course systems perspective proposed cannot fully account for all nuances of intimate relationships across the life course, it provides a scaffold for initiating research to address a large number of topics.

Last, it must be noted that the current perspective, and particularly the analyses highlighted here, focuses specifically on understanding longitudinal changes over extended periods of times (i.e., multiple years or even decades). Nevertheless, this focus does not eliminate the need for research on aging that examines shorter longitudinal processes, which are often best examined using intensive longitudinal designs, such as daily diaries. These designs may be particularly helpful when examining the aging process for couples during acute times of transition (e.g., death of a partner; critical illness that immediately and substantially shifts daily dynamics). Although these research designs and analyses take a different form from those highlighted here, sizable portions of the perspective proposed are still very much applicable.

Conclusion

In the current article, the life course and systems perspectives were described and integrated into a life course systems perspective that can advance knowledge of the aging process of partners in enduring couple relationships. Recognizing the necessity for longitudinal analytical techniques that can appropriately address hypotheses derived from theory, we then demonstrated how an integrated life course systems perspective can inform empirically

testable hypotheses utilizing advanced analytical approaches, particularly CL-AR and LGCM approaches. Theory development and analytical advances should be an iterative process in which theory informs the analytical approaches utilized and analytical advances also contribute to the creation and revision of theories. That is, analytical approaches are a scientific tool allowing researchers, including family gerontologists, to test their own theories and revise extant theories as needed. To this end, the current article utilizes the life course systems perspective and the analytical approaches described to recommend future directions for strengthening the integrated life course systems perspective to enhance knowledge of couples' aging process.

Through these theoretical and analytical advancements, family gerontologists are poised to contribute knowledge that can be utilized to improve the well-being of families, particularly as it relates to aging in the context of relationships. For instance, this knowledge can inform prevention and intervention programs for older adults as well as policy changes to improve well-being in later life by enacting a long view that considers how structural and social characteristics contribute to aging processes over time. Specifically, this article emphasizes several broad aspects of couple aging to be considered by prevention and intervention programs. First, programs must conceptualize couples as systems in which social and aging (i.e., developmental) trajectories unfold, thereby recognizing the need to enact a "long view" when seeking to implement change. Second, these trajectories are influenced by intra- and interindividual (between-partners) forces, which emphasizes the need for couple-focused programs. Third, developmental and social trajectories are influenced by various external factors (particularly socioeconomic factors and structural factors in their environment), which emphasizes the need for policy interventions. Finally, because existing research suggests that characteristics representing elements of individuals' agency (e.g., mastery) shape their developmental and social trajectories and moderate the influence of external factors, the perspective highlights the role of agency and supports the need for prevention and intervention efforts to assist in the development of individuals' resilience factors.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

This research is currently supported by a grant from the National Institute on Aging (AG043599, Kandauda A. S. Wickrama, PI). The content is solely the responsibility of the authors and does not necessarily represent the official views of the funding agencies. Support for earlier years of the study also came from multiple sources, including the National Institute of Mental Health (MH00567, MH19734, MH43270, MH59355, MH62989, MH48165, MH051361), the National Institute on Drug Abuse (DA05347), the National Institute of Child Health and Human Development (HD027724, HD051746, HD047573, HD064687), the Bureau of Maternal and Child Health (MCJ-109572), and the MacArthur Foundation Research Network on Successful Adolescent Development Among Youth in High-Risk Settings.

References

- Arbeev KG, Ukraintseva SV, Bagley O, Zhbannikov IY, Cohen AA, Kulminski AM, & Yashin AI (2018). "Physiological dysregulation" as a promising measure of robustness and resilience in studies of aging and a new indicator of preclinical disease. *Journals of Gerontology: Series A*, 74, 462–468. 10.1093/gerona/gly136

- Berry D, & Willoughby MT (2017). On the practical interpretability of cross-lagged panel models: Rethinking a developmental workhorse. *Child Development*, 88, 1186–1206. 10.1111/cdev.12660 [PubMed: 27878996]
- Bookwala JE (2016). *Couple relationships in the middle and later years: Their nature, complexity, and role in health and illness*. Washington, DC: American Psychological Association. 10.1037/14897-000
- Booth A, McHale S, & Lansdale N (2011). *Biosocial research contributions to understanding family processes and problems*. New York, NY: Springer. 10.1007/978-1-4419-7361-0
- Broderick CB (1993). *Understanding family process: Basics of family systems theory*. Newbury Park, CA: Sage.
- Brown SL, & Lin IF (2012). The gray divorce revolution: Rising divorce among middle-aged and older adults, 1990–2010. *Journals of Gerontology: Series B*, 67, 731–741. 10.1093/geronb/gbs089
- Carstensen LL (1992). Social and emotional patterns in adulthood: Support for socioemotional selectivity theory. *Psychology and Aging*, 7, 331–338. 10.1037/0882-7974.7.3.331 [PubMed: 1388852]
- Cobb LK, McAdams-DeMarco MA, Gudzone KA, Anderson CA, Demerath E, Woodward M, Selvin E, & Coresh J (2015). Changes in body mass index and obesity risk in married couples over 25 years: The ARIC cohort study. *American Journal of Epidemiology*, 183, 435–443. 10.1093/aje/kwv112 [PubMed: 26405117]
- Conger RD, & Elder GH Jr. (1994). *Families in troubled times: Adapting to change in rural America*. Hawthorne, NY: Aldine de Gruyter.
- Cox MJ, & Paley B (1997). Families as systems. *Annual Review of Psychology*, 48, 243–267. 10.1146/annurev.psych.48.1.243
- Coyne JC, & Downey G (1991). Social factors and psychopathology: Stress, social support, and coping processes. *Annual Review of Psychology*, 42, 401–425. 10.1146/annurev.ps.42.020191.002153
- Curran PJ, Howard AL, Bainter SA, Lane ST, & McGinley JS (2014). The separation of between-person and within-person components of individual change over time: A latent curve model with structured residuals. *Journal of Consulting and Clinical Psychology*, 82, 8–94. 10.1037/a0035297
- Dich N, Hansen ÅM, Avlund K, Lund R, Mortensen EL, Bruunsgaard H, & Rod NH (2015). Early life adversity potentiates the effects of later life stress on cumulative physiological dysregulation. *Anxiety, Stress, & Coping*, 28, 372–390. 10.1080/10615806.2014.969720
- Ehm J, Hasselhorn M, & Schmiedek F (2019). Analyzing the developmental relation of academic self-concept and achievement in elementary school children: Alternative models point to different results. *Developmental Psychology*, 55, 2336–2351. 10.1037/dev0000796 [PubMed: 31535896]
- Elder GH Jr. (1998). The life course as developmental theory. *Child Development*, 69, 1–12. 10.1111/j.1467-8624.1998.tb06128.x [PubMed: 9499552]
- Elder G, & Geile J (Eds.) (2009). *The craft of life course research*. New York, NY: Guilford Press.
- Geronimus AT, Hicken M, Keene D, & Bound J (2006). “Weathering” and age patterns of allostatic load scores among Blacks and Whites in the United States. *American Journal of Public Health*, 96, 826–833. 10.2105/AJPH.2004.060749 [PubMed: 16380565]
- Gibbons FX, Kingsbury JH, Weng C-Y, Gerrard M, Cutrona CE, Wills TA, & Stock M (2014). Effects of perceived racial discrimination on health status and health behavior: A differential mediation hypothesis. *Health Psychology*, 33, 11–19. 10.1037/a0033857 [PubMed: 24417690]
- Godfrey WB, Yorgason JB, Zhang Y, Hicken BL, Chen W, & Rupper RW (2018). Variability in spousal perceptions of caregiving and its relationship to older caregiver health outcomes. *Journal of General Internal Medicine*, 33, 1504–1511. 10.1007/s11606-018-4408-8 [PubMed: 29594934]
- Gotlib IH, & Wheaton B (1997). *Stress and adversity over the life course: Trajectories and turning points*. Cambridge, England: Cambridge University Press. 10.1017/CBO9780511527623
- Grimm KJ, Ram N, & Estabrook R (2017). *Growth modeling: Structural equation and multilevel approaches*. New York, NY: Guilford.
- Hamagami F, & McArdle JJ (2007). Dynamic extensions of latent difference score models. In Boker SM & Wenger MJ (Eds.), *Data analytic techniques for dynamical systems in the social and behavioral sciences* (pp. 47–85). Mahwah, NJ: Erlbaum.

- Hamaker EL, Kuiper RM, & Grasman RP (2015). A critique of the cross-lagged panel model. *Psychological Methods*, 20, 102–116. 10.1037/a0038889 [PubMed: 25822208]
- Hays RD, Sherbourne CD, & Mazel RM (1993). The Rand 36-item Health Survey 1.0. *Health Economics*, 2, 217–227. 10.1002/hec.4730020305 [PubMed: 8275167]
- Helms HM, Supple AJ, & Proulx C (2011). Mexican origin couples in the early years of parenthood: Marital well-being in ecological context. *Journal of Family Theory & Review*, 3, 67–95. 10.1111/j.1756-2589.2011.00085.x
- Hoffman L (2015). *Longitudinal analysis: Modeling within person fluctuation and change*. New York, NY: Routledge.
- Huston TL (2000). The social ecology of marriage and other intimate unions. *Journal of Marriage and Family*, 62, 298–320. 10.1111/j.1741-3737.2000.00298.x
- Jajodia A (2012). Dynamic structural equation models of change. In Newsom JT, Jones RN, & Hofer SM (Eds.), *Longitudinal data analysis: A practical guide for researchers in aging, health, and social sciences* (pp. 291–328). New York, NY: Routledge.
- Jöreskog KG (1970). Estimation and testing of simplex models. *British Journal of Mathematical and Statistical Psychology*, 23, 121–145. 10.1111/j.2044-8317.1970.tb00439.x
- Karney BR, & Bradbury TN (1995). The longitudinal course of marital quality and stability: A review of theory, methods, and research. *Psychological Bulletin*, 118, 3–34. 10.1037/0033-2909.118.1.3 [PubMed: 7644604]
- Kearney MW (2016). Cross lagged panel analysis. In Allen MR (Ed.), *The Sage encyclopedia of communication research methods*. Thousand Oaks, CA: Sage.
- Kiecolt-Glaser JK, & Wilson SJ (2017). Lovesick: How couples' relationships influence health. *Annual Review of Clinical Psychology*, 13, 421–443. 10.1146/annurev-clinpsy-032816-045111
- Koball HL, Besculides M, Goesling B, Harris KM, Lee H, & DeLeone FY (2010). Marriage and health in the transition to adulthood: Evidence for African Americans in the Add Health Study. *Journal of Family Issues*, 31, 1106–1143. 10.1177/0192513X10365823 [PubMed: 21833154]
- Ladwig K-H, Marten-Mittag B, Löwel H, Döring A, & Wichmann HE (2006). Synergistic effects of depressed mood and obesity on long-term cardiovascular risks in 1510 obese men and women: Results from the MONICA-KORA Augsburg Cohort Study 1984–1998. *International Journal of Obesity*, 30(9), 1408–1414. 10.1038/sj.ijo.0803285 [PubMed: 16552409]
- Ledermann T, & Kenny DA (2012). The common fate model for dyadic data: Variations of a theoretically important but underutilized model. *Journal of Family Psychology*, 26, 140–148. 10.1037/a0026624 [PubMed: 22201247]
- Lee TK, Wickrama KAS, Kwon JA, Lorenz FO, & Oshri A (2017). Antecedents of transition patterns of depressive symptoms from adolescent to young adulthood. *British Journal of Developmental Psychology*, 35, 498–515. 10.1111/bjdp.12189
- Lee TK, Wickrama KAS, O'Neal CW (2018). Early socioeconomic adversity and cardiometabolic risk in young adults: Mediating roles of risky health lifestyle and depressive symptoms. *Journal of Behavioral Medicine*, 42, 150–161. 10.1007/s10865-018-9952-5 [PubMed: 30039261]
- Lee TK, Wickrama KAS, & O'Neal CW (2019). Midlife general psychopathology trajectories and later-life physical health in husbands and wives. *Health Psychology*, 38(6), 553–562. 10.1037/hea0000745 [PubMed: 31008645]
- Lee TK, Wickrama KAS, & O'Neal CW (2020). Health continuity over mid-later years in enduring marriages: Economic pressure as couple- and individual-level mediator. *Journal of Social and Personal Relationships*, 37(2), 377–392. 10.1177/0265407519865971
- Lee TK, Wickrama KAS, O'Neal CW, & Prado G (2018). Identifying diverse life transition patterns from adolescence to young adulthood: The influence of early socioeconomic context. *Social Science Research*, 70, 212–228. 10.1016/j.ssresearch.2017.12.001 [PubMed: 29455745]
- Lorenz F, Conger R, Simons R, & Whitbeck L (1995). The effects of unequal covariances and reliabilities on contemporaneous inference: The case of hostility and marital happiness. *Journal of Marriage and Family*, 57, 1049–1064. 10.2307/353422
- Lorenz FO, Elder GH Jr., Bao WN, Wickrama KAS, & Conger RD (2000). After farming: Emotional health trajectories of farm, nonfarm, and displaced farm couples. *Rural Sociology*, 65, 50–71. 10.1111/j.1549-0831.2000.tb00342.x

- Luecken L, & Roubinov DS (2012). Hostile behavior links negative childhood family relationships to heart rate reactivity and recovery in young adulthood. *International Journal of Psychophysiology*, 84, 172–179. 10.1016/j.ijpsycho.2012.02.003 [PubMed: 22331058]
- Maggio M, Guralnik JM, Longo DL, & Ferrucci L (2006). Interleukin-6 in aging and chronic disease: A magnificent pathway. *Journals of Gerontology Series A-Biological Sciences and Medical Sciences*, 61, 575–584. 10.1093/gerona/61.6.575
- Meredith W, & Tisak J (1990). Latent curve analysis. *Psychometrika*, 55, 107–122. 10.1007/BF02294746
- Milkie M (2010). The stress process model: Some family-level considerations. In Avison WR, Aneshensel CS, Schieman S, & Wheaton B (Eds.), *Advances in the conceptualization of the stress process* (pp. 93–108). New York, NY: Springer. 10.1007/978-1-4419-1021-9_6
- Moody-Ayers S, Lindquist K, Sen S, & Covinsky KE (2007). Childhood social and economic well-being and health in older age. *American Journal of Epidemiology*, 166, 1059–1067. 10.1093/aje/kwm185 [PubMed: 17720682]
- Muthén B (2004). Latent variable analysis: Growth mixture modeling and related techniques for longitudinal data. In Kaplan D (Ed.), *Handbook of quantitative methodology for the social sciences* (pp. 345–368). London, England: Sage.
- Papp LM, Pendry P, Simon CD, & Adam EK (2013). Spouses' cortisol associations and moderators: Testing physiological synchrony and connectedness in everyday life. *Family Process*, 52, 284–298. 10.1111/j.1545-5300.2012.01413.x [PubMed: 23763687]
- Pearlin LI, Schieman S, Fazio EM, & Meersman SC (2005). Stress, health, and the life course: Some conceptual perspectives. *Journal of Health and Social Behavior*, 46, 205–219. 10.1177/002214650504600206 [PubMed: 16028458]
- Peugh JL, DiLillo D, Panuzio J (2013). Analyzing mixed-dyadic data using structural equation models. *Structural Equation Modeling*, 20, 314–337. 10.1080/10705511.2013.769395
- Pischon T, Hu FB, Rexrode KM, Gorman CJ, Manson JE, & Rimm EB (2008). Inflammation, the metabolic syndrome, and risk of coronary heart disease in women and men. *Atherosclerosis*, 197, 392–399. 10.1016/j.atherosclerosis.2007.06.022 [PubMed: 17681508]
- Robles TF (2014). Marital quality and health: Implications for marriage in the 21st century. *Current Directions in Psychological Science*, 23, 427–432. 10.1177/0963721414549043 [PubMed: 25544806]
- Rowe JW, & Kahn RL (1998). *Successful aging*. New York, NY: Pantheon Books.
- Settersten RA (2003). Propositions and controversies in life-course scholarship. In Settersten RA (Ed.), *Invitation to the life course: Toward new understandings of later life* (pp. 15–45). Amityville, NY: Baywood.
- Stowe JD, & Cooney TM (2015). Examining Rowe and Kahn's concept of successful aging: Importance of taking a life course perspective. *Gerontologist*, 55, 43–50. 10.1093/geront/gnu055 [PubMed: 24906516]
- Umberson D, Williams K, Powers DA, Liu H, & Needham B (2006). You make me sick: Marital quality and health over the life course. *Journal of Health and Social Behavior*, 47, 1–16. 10.1177/002214650604700101 [PubMed: 16583772]
- Utz RL, Berg CA, & Butner J (2016). It's a family affair: Reflections about aging and health within a family context. *Gerontologist*, 57, 129–135. 10.1093/geront/gnw081 [PubMed: 27102059]
- Von Bertalanffy L (1969). *General systems theory: Foundations, development, applications*. New York, NY: Braziller.
- Westman M, & Etzion D (1995). Crossover of stress, strain and resources from one spouse to another. *Journal of Organizational Behavior*, 16, 169–181. 10.1002/job.4030160207
- Whittaker TA, Beretvas SN, & Falbo T (2014) Dyadic curve-of-factors model: An introduction and illustration of a model for longitudinal nonexchangeable dyadic data. *Structural Equation Modeling*, 21, 303–317. 10.1080/10705511.2014.882695 [PubMed: 24883011]
- Wickrama KAS, King VA, O'Neal CW, & Lorenz FO (2019). Stressful work trajectories and depressive symptoms in middle-aged couples: Moderating effect of marital warmth. *Journal of Aging and Health*, 31, 484–508. 10.1177/0898264317736135

- Wickrama KAS, Klopach E, & O'Neal CW (2020). Patterning of midlife marital trajectories in enduring marriages in a dyadic context: Physical and mental health outcomes in later years. *Journal of Social and Personal Relationships*. 10.1177/0265407519899726
- Wickrama KAS, Klopach E, O'Neal CW, Beach S, Nepl T, & Bae D (2017). Life course patterns of concurrent trajectories of BMI and affective symptoms of rural mothers: Socioeconomic antecedents and disease outcomes in later life. *Journals of Gerontology: Series B*, 74(7), 1233–1244. 10.1093/geronb/gbx121
- Wickrama KAS, Lee S, Klopach ET, & Wickrama T (2019). Stressful work conditions, positive affect, and physical health of middle-aged couples: A dyadic analysis. *Stress & Health*, 35(4), 382–395. 10.1002/smi.2866 [PubMed: 30882975]
- Wickrama KAS, Lee TK, & O'Neal CW (2020). Couple BMI trajectory patterns during mid-later years: Socioeconomic stratification and later-life physical health outcomes. *Journal of Family Psychology*. 10.1037/fam0000644
- Wickrama KAS, Lee TK, O'Neal CW, & Lorenz FO (2016). Higher-order growth curves and mixture modeling with Mplus: A practical guide. New York, NY: Taylor and Francis. 10.4324/9781315642741
- Wickrama KAS, Lorenz FO, & Conger RD (1997). Parental support and adolescent health: A growth curve analysis. *Journal of Health and Social Behavior*, 38, 149–163. 10.2307/2955422 [PubMed: 9212536]
- Wickrama KAS, Mancini JA, Kwag K, Kwon J (2012). Heterogeneity in health trajectories of older adults and socioeconomic stratification: A latent trajectory class analysis. *Journal of Gerontology: Series B*, 68, 290–297. 10.1093/geronb/gbs111
- Wickrama KAS, O'Neal CW, & Lorenz FO (2018). The decade-long effect of work insecurity on husbands' and wives' midlife health mediated by anxiety: A dyadic analysis. *Journal of Occupational Health Psychology*, 23, 350–360. 10.1037/ocp0000084 [PubMed: 28358574]
- Wickrama KAS, O'Neal CW, & Nepl T (2019). Midlife family economic hardship and later life cardiometabolic health: The protective role of marital integration. *Gerontologist*, 59, 892–901. 10.1093/geront/gny047 [PubMed: 29846563]
- Willett J, & Sayer AG (1994). Using covariance structure analysis to detect correlates and predictors of individual change over time. *Psychological Bulletin*, 116, 363–381. 10.1037/0033-2909.116.2.363
- Xia X, Chen W, McDermott J, & Han JJ (2017). Molecular and phenotypic biomarkers of aging. *F1000Research*, 6, 860. 10.12688/f1000research.10692.1 [PubMed: 28663789]

Figure 1.

INTEGRATED LIFE COURSE SYSTEMS PERSPECTIVE TO STUDY COUPLE AGING. H = HUSBAND; W = WIFE; H_H , H_W = SPOUSES' DEVELOPMENTAL OR AGING TRAJECTORIES; S_H , S_W = SPOUSES' SOCIAL TRAJECTORIES; H_H , H_W , S_H , AND S_W CAN BE PARALLEL OR INTERLOCKING (INTRA- AND INTERINDIVIDUAL) ASSOCIATIONS OVER TIME (T) WITH PARTNER EFFECTS (P). D = DOWNWARD INFLUENCES FROM CONTEXT TO INDIVIDUAL; U = UPWARD INFLUENCES FROM INDIVIDUAL TO CONTEXT; R, Z, AND Q = EFFECTS OF DISTAL SOCIOECONOMIC FACTORS, STRUCTURAL FACTORS, AND PERSONAL CHARACTERISTICS, RESPECTIVELY, ON INDIVIDUALS' AND COUPLES' SOCIAL AND AGING PROCESSES.

Figure 2.

INTRA- AND INTERINDIVIDUAL CROSS-LAGGED AUTO-REGRESSIVE (CL-AU) APPROACH WITH REPEATED MEASURES. STABILITY AND CROSS-LAGGED PATHS FOR INTRAINDIVIDUAL ASSOCIATIONS ARE IN GRAY; H AND W SUPERSCRIPTS REPRESENT HUSBAND AND WIFE, RESPECTIVELY. PF = PHYSICAL FUNCTIONING, EH = ECONOMIC HARDSHIP, AND T = TIME POINT.

Figure 3.

INTRA- AND INTER-INDIVIDUAL CROSS-LAGGED CONTEMPORANEOUS MODEL CONSIDERING THE COUPLE CONTEXT. PF = PHYSICAL FUNCTIONING, EH = ECONOMIC HARDSHIP, AND T = TIME POINT. PATHS FOR INTRA- AND INTER-INDIVIDUAL ASSOCIATIONS ARE SHOWN IN GRAY. FACTOR LOADINGS ARE SHOWN WITH DASHED LINES. H, W, AND C SUPERSCRIPTS REPRESENT HUSBAND, WIFE, AND COUPLE, RESPECTIVELY.

Figure 4.

RANDOM-INTERCEPT CROSS-LAGGED AUTOREGRESSIVE (RI-CL-AR) APPROACH. RI = RANDOM INTERCEPT, RE = RESIDUAL, PF = PHYSICAL FUNCTIONING, AND T = TIME POINT. H AND W SUPERSCRIPTS REPRESENT HUSBAND AND WIFE, RESPECTIVELY. FACTOR LOADINGS ARE SHOWN WITH DASHED LINES.

Figure 5. LATENT GROWTH CURVE MODELS (LGCs). PF = PHYSICAL FUNCTIONING, EH = ECONOMIC HARDSHIP, I = INITIAL LEVEL, AND S = SLOPE. THE H, W, AND C SUPERSCRIPTS REPRESENT HUSBANDS, WIVES, AND COUPLES, RESPECTIVELY.

Figure 6.

AUTOREGRESSIVE LATENT TRAJECTORY WITH STRUCTURED RESIDUALS (ALT-SR) APPROACH. I = INITIAL LEVEL, SL = SLOPE, RE = RESIDUAL, PF = PHYSICAL FUNCTIONING, AND T = TIME POINT. H AND W SUPERSCRIPTS REPRESENT HUSBAND AND WIFE, RESPECTIVELY. GRAY ARROWS REPRESENT INTRAINDIVIDUAL PROCESSES. FACTOR LOADINGS ARE SHOWN WITH DASHED LINES.

Figure 7.

GROWTH MIXTURE MODELING (GMM). C = LATENT CLASS, k = NUMBER OF LATENT CLASS, I = INITIAL LEVEL, SL = SLOPE, PF = PHYSICAL FUNCTIONING, AND EH = ECONOMIC HARDSHIP. H AND W SUPERSCRITS REPRESENT HUSBAND AND WIFE, RESPECTIVELY. GRAY ARROWS REPRESENT INTRAINDIVIDUAL PROCESSES. FACTOR LOADINGS ARE SHOWN WITH DASHED LINES.