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Katherine M. Arenella
University of Missouri - St. Louis, katarenella@gmail.com

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Women's Sexual Satisfaction in the Context of Midlife Relationships:

Examining an Ecological Model and Intergenerational Caregiving

Katherine M. Arenella

M.A., Clinical Psychology, University of Missouri-St. Louis, 2017
B.A., Psychology, Scripps College, 2014

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Advisory Committee

Ann Steffen, Ph.D., ABPP
Chairperson

Matthew Taylor, Ph.D.

Susan Kashubeck-West, Ph.D.

Kuei-Hsiang Hsueh, Ph.D.

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Abstract

This study examined an ecological model of sexual satisfaction in midlife women in relationships, and paid particular attention to the role of intergenerational caregiving in predicting satisfaction. Participants were 1,411 midlife women in relationships who participated in the Midlife in the United States (MIDUS) national study. Using split samples for replication purposes, data from this survey were examined to test the hypothesis that an ecological model - including the macrosystem level variable of religiosity, the exosystem level variables of SES, social support, and parenthood, the mesosystem level variables of relationship satisfaction, affectual solidarity, relationship length, and sexual functioning, and the microsystem level variables of age, negative affect, and physical health and functioning – would together predict sexual satisfaction. This study also hypothesized that family caregiving status, and specifically being an intergenerational caregiver, would add to the predictive power of the existing model, with caregiving associated with decreased satisfaction. Further, this study hypothesized that the extent of the intergenerational caregiving role would be negatively associated with sexual satisfaction, above and beyond caregiving status. Finally, this study hypothesized that the relationship between extent of intergenerational caregiving and sexual satisfaction would be moderated by perceived partner support, and that this relationship would be mediated by levels of negative affect. Support for an ecological model of sexual satisfaction was found, with income, affectual solidarity, and sexual function significantly contributing to sexual satisfaction across both split samples. However, caregiver status was not associated with sexual satisfaction and did not add any predictive power to the existing ecological model. Taken together, results suggest that an ecological

model is a relevant organizing framework for understanding sexual satisfaction in this population of women.

Women's Sexual Satisfaction in the Context of Midlife Relationships: Examining an Ecological Model and Intergenerational Caregiving

Sexual satisfaction is a critical component of general wellbeing and is tied to various physical and mental health outcomes. Sexual satisfaction is also considered an important part of overall sexual health, as well as a sexual right that should be recognized in laws and human rights statements (World Health Organization, 2010). Despite the importance of sexual satisfaction, there is a lack of research on this construct as it relates to middle-aged women. Middle-aged women, generally defined as women between 45 – 65 years of age, are an important and unique group in which to study sexual satisfaction. As a group, they face a range of specific circumstances that may be tied to sexuality. For example, within the midlife period, many women go through menopause, are in long-term relationships, and experience familial role changes, all of which likely impact sexual satisfaction (Ahlborg et al., 2005; Dundon & Rellini, 2010; Impett et al., 2014).

There are various definitions of sexual satisfaction in the literature, with Lawrance and Byers' (1995) definition being the most prominent in the literature and also tied closely to theory. Sexual satisfaction is defined as "an affective response arising from one's subjective evaluation of the positive and negative dimensions associated with one's sexual relationship" (Lawrance & Byers, 1995). This definition includes both cognitive and affective constructs; it views sexual satisfaction as both an evaluative process and an emotional one (Byers & Rehman, 2014). The term "sexual wellbeing" is also used throughout the literature to describe this construct (Byers & Rehman, 2014).

Sexual satisfaction is related to both general and specific physical and psychological health outcomes. Sexual satisfaction is associated with overall quality of

life and overall health (Impett et al., 2014; Sánchez-Fuentes et al., 2014). For example, sexual satisfaction is related to life happiness and is tied to important relationship variables such as marriage stability and relationship satisfaction (Impett et al., 2014; Mark et al., 2014; Rosen & Bachmann, 2008).

Sexuality is associated with specific physical outcomes, including mortality and cardiovascular health (Diamond & Huebner, 2012). Sexuality is also tied to emotion regulation processes and general emotional health (Bridges et al., 2004; Diamond & Huebner, 2012). Sexual satisfaction is a significant and meaningful experience for women, and yet the current research on sexual satisfaction is lacking with regard to midlife women in relationships. More research is vital to understand the needs of this specific population.

Middle-Aged Women in Relationships

The existing research on sexuality has shown that women tend to experience sexual satisfaction differently than men. Gender affects multiple aspects of sexuality, including the perception and process of relationship satisfaction as it relates to sexual satisfaction (Impett et al., 2014). Women tend to have a heightened focus on relationships within their sexuality, whereas men are more likely to separate relationships from their sexuality (Impett et al., 2014). There are also gender differences in sociosexual orientations, defined as an individual's sexual attitudes, preferences, and behaviors, which likely lead to different experiences of sexual satisfaction (Impett et al., 2014). Women tend to report greater sexual fluidity and hold differing definitions of sexual desire than men (Baumeister, 2000; Impett et al., 2014). Overall, women's sexuality tends to be strongly rooted in relationships, family perceptions, and self-relationships, as

opposed to sexual frequency (Bridges et al., 2004). Therefore, it is not surprising that research has found different models and predictors of sexual satisfaction between genders (Heiman et al., 2011). For this reason, it is helpful to study middle-aged women as a group, as opposed to all genders at once.

Middle age also has an impact on sexual satisfaction. Researchers have found that midlife women tend to experience less sexual satisfaction than younger women, and that dissatisfaction increases with age (Dundon & Rellini, 2010). Women in midlife have also reported lower sexual desire, decreased sexual activity, and reduced relationship satisfaction (Dundon & Rellini, 2010). Declines in sexual satisfaction tend to become steeper for women as they get older, beginning in later mid-life (Byers & Rehman, 2014).

It is important to note how the experiences of women currently in midlife might be different from previous cohorts given that these factors might influence sexual satisfaction. A large portion of the current middle age population is from the baby-boom cohort, a generation that comes with a number of unique life events. For example, the baby-boom cohort has shown greater health, higher education, and more interest in maintaining youthful appearances than previous generations in midlife (Whitbourne & Willis, 2006). Although the vast majority of midlife women from this cohort live with a romantic partner, the proportion of people married has declined over time due to an increase in divorce rates, as well as delayed timing of first marriages (Eggebeen & Sturgeon, 2006). Additionally, a greater proportion of midlife women have children living in the home through their mid-fifties, mostly as a result of adult children increasingly staying at home due to increased educational demands and a trend for greater parental involvement (Blieszner & Roberto, 2006; Eggebeen & Sturgeon, 2006;

Infurna et al., 2020). The age of motherhood has shifted in the United States, such that mothers of newborns are slightly older now than in previous cohorts, with 14% of newborn births to women thirty-five and older in 2010 (Taylor & Cohn, 2010). Therefore, a greater percentage of midlife women will have children in the home who are dependent minors. A major trend seen in the current midlife cohort involves increased informal caregiving demands for aging parents (Infurna et al., 2020). It is also essential to understand the diversity and heterogeneity of the current group of midlife women. For example, race and ethnicity accounts for major differences in marriage rates and income among this cohort (Eggebeen & Sturgeon, 2006).

Common experiences of midlife women, such as long-term relationships and caregiving, likely affect sexual satisfaction. Because women's sexual satisfaction is closely related to many factors beyond sexual frequency, there is a great likelihood that middle age influences satisfaction by affecting these midlife experiences. For example, midlife relationships tend to be long-term, and length of relationship has been found to relate to satisfaction in both positive and negative directions (Dundon & Rellini, 2010; Sánchez-Fuentes et al., 2014). Caregiving for an older adult is an especially common experience for midlife women, yet there is a lack of research available on how this might affect sexual satisfaction. More research is needed on the impact of the caregiving role on the sexuality of midlife women.

The Ecological Framework as a Meta-Model of Sexual Satisfaction

An ecological model can be used as an organizing framework for the predictors of sexual satisfaction in middle-aged women. There is currently a diverse range of theories and measures of sexual satisfaction, which is one of the more pressing problems in the

literature (Sánchez- Fuentes et al., 2014). Additionally, the existing models of satisfaction do not account for all of the researched predictors of sexual satisfaction, highlighting the need for more complex models and understandings (Byers, 2005; Štulhofer et al., 2010). Given the variety of theories, measures, and models for sexual satisfaction, in combination with research showing how personal and social factors are tied to women's sexuality, an ecological model is equipped to provide a more comprehensive understanding of sexual satisfaction in this population. Ecological theory, broadly, outlines how development or other outcomes can be organized into levels that are interrelated: the microsystem, mesosystem, exosystem, and macrosystem (Bronfenbrenner, 1994).

Sánchez-Fuentes et al. (2014) provide a conceptualization of Bronfenbrenner's (1994) ecological theory's application to sexual satisfaction. These researchers conducted a literature review on sexual satisfaction research from 1979 through 2012 and found that sexual satisfaction was most easily organized according to ecological model levels, given that satisfaction is associated with individual level variables such as psychological and physical health, as well as relationship and social level variables such as intimate relationships, sexual response, social support, family relationships, and cultural values (Sánchez-Fuentes et al., 2014).

Support for an ecological framework of sexual satisfaction was also found by Henderson, Lehavot, and Simoni (2009). Henderson et al. (2009) tested an ecological model on both heterosexual women and lesbian and bisexual women, and found that the ecological model predicted more variance in sexual satisfaction than other models, including the Interpersonal Exchange Model. The ecological model predicted 65% of the

variance for heterosexual women and 54% of the variance for lesbian/bisexual women (Henderson et al., 2009). These researchers drew attention to how an ecological model helps ensure that researchers do not fall into the trap of using medical models or male-centered models to study sexuality in women (Henderson et al., 2009).

This model also incorporates aspects of existing conceptualizations, models, and theories of sexual satisfaction. For example, the Interpersonal Exchange Model of Sexual Satisfaction (IEMSS) is one of the most researched theories of sexual satisfaction and posits that sexual satisfaction depends on the levels of rewards and costs in sexual relationships, as well as comparison levels and perceptions of equality between partners of these rewards and costs (Lawrance & Byers, 1995). This model can be understood as part of the mesosystem level because partnership dynamics play an important role in this conceptualization of sexual satisfaction, such that dyadic equality is one predictor of satisfaction. The ecological model can also include variables relevant to Štulhofer et al.'s (2010) New Sexual Satisfaction Scale (NSSS), which divides satisfaction into "ego-centered" and "other-centered" components, as well as Philippsohn and Hartmann's (2009) two dimensions of sexual satisfaction, (1) feeling close with one's partner during sexual activity, and (2) positive bodily and emotional experiences. Finally, the ecological model can account for sexual script theory, which proposes that sexual interactions involve behavioral sequences rooted in social influences. These influences create cognitive scripts for individuals, such as specific plans for sexual interactions (Laumann & Gagnon, 1995). Because these existing conceptualizations of sexual satisfaction recognize individual, relationship-oriented, and broader social influences, they fit within an ecological model.

An ecological framework as a meta-model of sexual satisfaction is clearly indicated. Predictors of sexual satisfaction can be organized according to the ecological levels as defined by Sánchez-Fuentes et al. (2014): (1) Microsystem: individual characteristics; (2) Mesosystem: intimate relationships and sexual functioning; (3) Exosystem: social networks and social status; and (4) Macrosystem: institutional and societal factors. This paper offers a selective review of the key variables that have garnered the most consistent support throughout the literature. Figure 1 offers a pictorial representation of these levels and the relevant predictors.

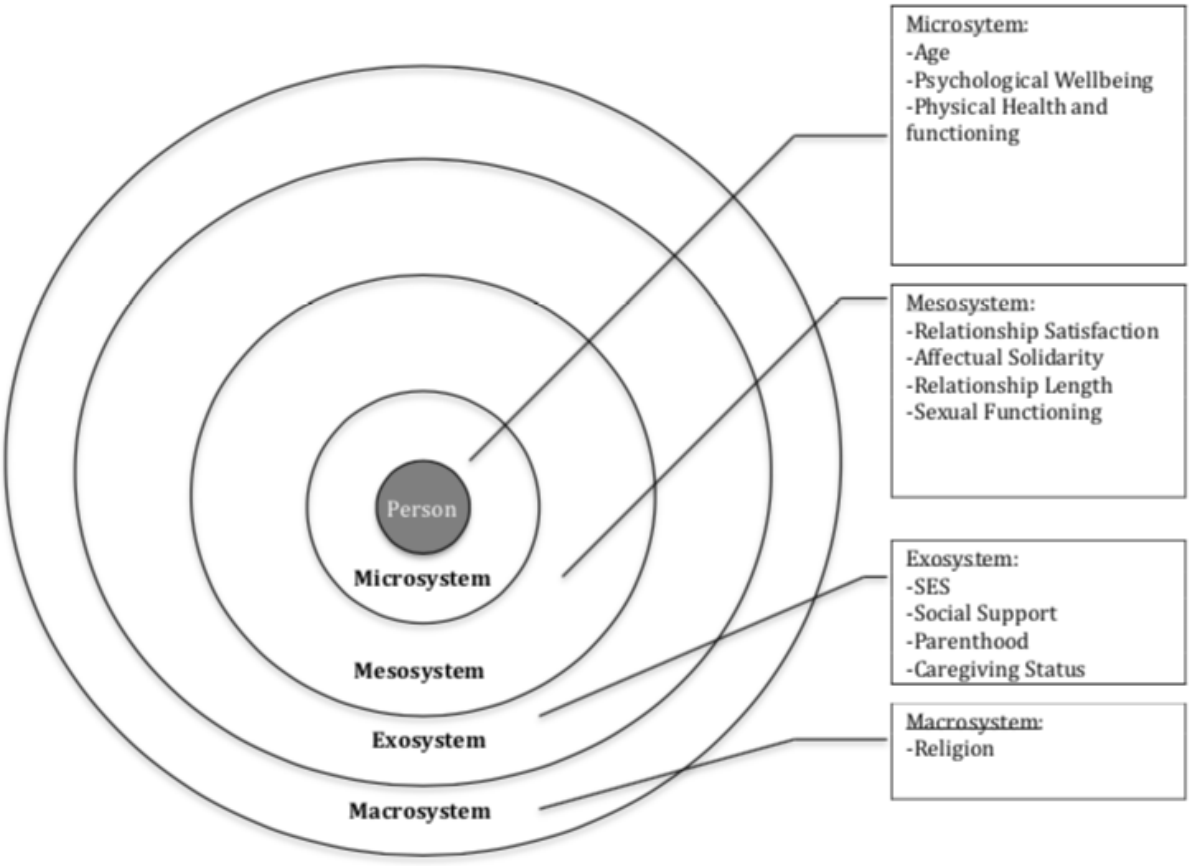


Figure 1. Ecological Framework for Sexual Satisfaction

Microsystem Predictors of Sexual Satisfaction

The microsystem as it relates to sexual satisfaction is defined as a person's immediate environment, including individual characteristics such as gender and personality (Bronfenbrenner, 1994; Sánchez-Fuentes et al., 2014). For midlife women, microsystem-level variables that may affect sexual satisfaction include age, psychological wellbeing, and physical health and functioning.

Age

Research is mixed regarding the effects of age on sexual satisfaction in women. The majority of research points to decreased satisfaction with heightened age due to aging-related variables (Byers & Rehman, 2014; Sánchez-Fuentes et al., 2014). For example, older age is associated with less sexual activity and sexual thoughts, as well as increased sexual dysfunction and chronic disease, all of which negatively impact sexual satisfaction (Sánchez-Fuentes et al., 2014). Women have been found to experience greater declines in sexual frequency when compared to men, in both middle adulthood and older adulthood (Impett et al., 2014). In one study, age predicted declines in sexual quality of life for aging men and women; however, once other domains such as sexual effort and control were accounted for, this relationship reversed direction (Forbes et al., 2017). In Byers and Rehman's (2014) review on sexual well-being research, they similarly found that age-related declines in sexual satisfaction were due to other demographic or sexual variables that were associated with older age, such as habituation to a partner and health status.

Correlations between age and satisfaction tend to weaken, disappear, or even reverse when research takes other aging factors into account. This finding is especially

pertinent to health variables, such that the negative association between age and satisfaction may be largely due to health-related aspects of aging (Byers & Rehman, 2014). Physical transformations that occur with age likely reduce sexual satisfaction, including increased chronic illnesses and hormonal changes that impact sexual activity and interest (Impett et al., 2014). For example, Laumann et al. (2006) found that age was no longer associated with sexual wellbeing after controlling for physical health status in adults aged 40-80, and that this was especially true for women. Similarly, in another study of midlife and older women, Huang et al. (2009) found that sexual satisfaction decreased with older age, but that this association disappeared when other factors were accounted for, including vaginal lubrication (Huang et al., 2009). Not all research comes to the same conclusion, however. Tomic et al. (2006) found that age was related to lower satisfaction, even when accounting for menopausal status and symptoms.

Increased age may also carry protective factors, as evidenced by some reports of *greater* satisfaction in a midlife population (Sánchez-Fuentes et al., 2014). For example, Forbes et al. (2017) found that the association between age and sexual quality of life was a positive one, after accounting for perceived control and sexual thought/effort. In midlife and beyond, there is a potential for greater intimacy with long-term partners, as well as more positive sexual attitudes (Sánchez-Fuentes et al., 2014). “Sexual wisdom” refers to the knowledge and skills that one acquires with age and life experience, such that midlife women might understand their partners’ and their own preferences more (Forbes et al., 2017). This makes sense given that quality, rather than quantity, of sexual encounters might be a greater predictor of sexual quality of life in older age (Forbes et al., 2017). In fact, sexual frequency declines in importance as people age (Forbes et al., 2017).

Expectations about sex tend to change with older age, such that older women reporting no recent sexual activity are more likely to be satisfied with the state of their sex lives compared to younger women reporting no recent sexual activity (Huang et al., 2009). Additionally, middle-aged and older women who experience declining sexual activity still report stable satisfaction, which may reflect changing expectations (Thomas et al., 2015).

Psychological Wellbeing and Depressed Affect

Depression, anxiety, and stress are all associated with decreased sexual satisfaction, as is the use of psychotropic drugs (Byers & Rehman, 2014; Sánchez-Fuentes et al., 2014). Because the transition into menopause is associated with increased psychological disorders, midlife women may be particularly prone to experiencing decreased satisfaction (Dundon & Rellini, 2010). Throughout the literature, depressed affect is consistently associated with decreased sexual functioning and decreased relationship satisfaction, both of which are closely tied with sexual satisfaction (Henderson et al., 2009). Not all the research agrees on depression's precise relationship with sexual satisfaction, however. In one study, depressive symptoms were correlated with decreased sexual satisfaction, but when other variables were accounted for such as sexual functioning, socioeconomic status, and relationship satisfaction, this relationship became non-significant (Henderson et al., 2009).

Anxiety, bipolar disorder, and substance use disorders are also related to decreased sexual satisfaction, and these associations remain after controlling for somatic disorders and childhood trauma (Vanwesenbeeck et al., 2014). It is possible that psychological disorders influence sexual satisfaction due to their effects on daily

functioning and relationships, in addition to symptomatic effects of reduced sexual desire (Vanwesenbeeck et al., 2014). Psychological wellbeing, in general, is also associated with sexual satisfaction, beyond the contribution of sexual function, age, and cohabitation length (Dundon & Rellini, 2010).

Physical Health and Functioning

Greater physical health and functioning are other microsystem-level variables related to higher sexual satisfaction (Sánchez-Fuentes et al., 2014). This is especially pertinent to midlife, given that physical activity was found to be associated with greater sexual enjoyment in middle-aged women, regardless of menopausal stage (Hess et al., 2009). Additionally, in a midlife and older adult sample of women, physical functioning was found to be more strongly associated with both sexual desire and activity than age (Huang et al., 2009). Researchers have often found correlations between fitness level, exercise frequency, and sexual satisfaction (Penhollow & Young, 2008). In fact, physical activity and exercise are sometimes recommended for individuals experiencing sexual satisfaction issues (Penhollow & Young, 2008). It is possible, however, that body image may account for some of the variance in this relationship. For example, in Weaver and Byers' (2006) study, they found that BMI and exercise were related to body image, but not to sexual functioning.

These microsystem predictors of age, psychological disorders, and physical health all appear to play a role in middle-aged women's experiences of sexual satisfaction. These individual characteristics also operate within interpersonal relationships to affect sexual satisfaction, including the intimate connections that make up the mesosystem.

Mesosystem Predictors of Sexual Satisfaction

The mesosystem level of sexual satisfaction includes close connections, such as intimate relationships, and sexual functioning within the context of these relationships (Sánchez-Fuentes et al., 2014). For midlife women in relationships, relevant mesosystem predictors of sexual satisfaction include relationship satisfaction, cohabitation length, and sexual functioning. Relationship satisfaction is discussed first as a framework to understand how more specific components of relationships, such as sexual functioning, contribute to satisfaction.

Relationship Satisfaction

Research has found clear associations between relationship satisfaction and sexual satisfaction. In fact, relationship satisfaction is one of the most examined predictors of sexual satisfaction and has been studied using theory-based definitions of sexual satisfaction. It is probable that relationship satisfaction and sexual satisfaction influence each other reciprocally, given that the existing research shows various directions of this relationship, including one affecting the other, bidirectional impacts, and concurrent changes (Byers, 2005; Byers & Rehman, 2014; Impett et al., 2014; Lawrance & Byers, 1995; Sprecher, 2002). Additionally, it is possible that both satisfaction constructs might be related to a third variable, such as intimate communication (Byers, 2005). Taken together, the research suggests that relationship satisfaction and sexual satisfaction influence each other in dynamic and impactful ways (Lawrance & Byers, 1995).

Relationship satisfaction is particularly relevant to midlife women's experiences of sexual satisfaction, given that middle age carries implications for relationship variables and quality. For example, most midlife relationships are long-term relationships

(Sánchez-Fuentes et al., 2014). Additionally, in women, the relationship between sexual satisfaction and relationship satisfaction becomes stronger with older age (Impett et al., 2014). It is also possible that middle age affects perceptions of rewards and costs in relationships, thereby influencing sexual satisfaction via the IEMMS (Lawrance & Byers, 1995). Middle age may also influence an individual's sexual script and feelings of connection to a partner, affecting sexual satisfaction according to sexual script theory, Philippsohn and Hartmann's (2009) model, and Štulhofer et al.'s (2010) New Sexual Satisfaction Scale (Laumann & Gagnon, 1995). Given that women tend to emphasize relationship factors in their evaluation of sexual satisfaction, it is clear that relationship satisfaction is a critical predictor of sexual satisfaction for this population.

Henderson et al.'s (2009) study points to the central role of relationship satisfaction in sexual satisfaction. In this study, relationship satisfaction mediated the association between social support and sexual satisfaction in both heterosexual and lesbian/bisexual women, as well as the association between sexual functioning and depressive symptoms (Henderson et al., 2009). In lesbian women, relationship satisfaction also mediated the relationship between social support and internalized homophobia, showing how relationship satisfaction can act as a protective force in the face of homophobic environments (Henderson et al., 2009). Finally, when relationship satisfaction is added into models of sexual satisfaction, it often accounts for a large portion of the predictive value (Henderson et al., 2009).

Forbes et al.'s (2017) study highlights the significance of relationship satisfaction, as well. When relationship quality and partner health were added into their model of sexual quality of life (SQoL), the other sex related variables, specifically perceived

control, frequency of sex, and thought and effort, declined in importance. Relationship quality and partner health also accounted for the positive relationship between age and SQoL, showing how the benefits of age on sexuality (i.e., sexual wisdom) are more likely to occur within a positive relationship context (Forbes et al., 2017).

Other relationship-oriented variables are also correlated with sexual satisfaction. For example, relationship adjustment has been found to predict sexual satisfaction above and beyond sexual function and age (Dundon & Rellini, 2010). Similarly, love and commitment motives for sexual behavior are positively correlated with sexual satisfaction (Byers & Rehman, 2014). It is likely that perceptions of partner solidarity, including perceived support and strain, also contribute to satisfaction.

Although relationship satisfaction and sexual satisfaction are highly related, they are still independent from each other. In Heiman et al.'s (2011) study on midlife and older couples, relationship satisfaction and sexual satisfaction only shared 16% of the variance and were each predicted by different variables. Individuals, however, may view these two constructs as fundamentally the same. This is one reason that research can be more robust when measuring more specific and related constructs to relationship satisfaction, such as partner solidarity. Relationship satisfaction is critical to predicting sexual satisfaction, and this may be especially true for midlife women in relationships.

Relationship Length

Given that a majority of midlife relationships are long-term, it is worth examining the impact of relationship length on sexual satisfaction. Longer relationships tend to be associated with lower satisfaction, but findings are not consistent (Sánchez-Fuentes et al., 2014). For example, relationship exclusivity and cohabitation are associated with greater

sexual satisfaction, even though these are also common characteristics of long-term relationships (Sánchez-Fuentes et al., 2014). One study found that for women, longer relationship duration actually led to greater satisfaction, with women in relationships of 30 years or longer reporting greater satisfaction (Heiman et al., 2011).

Relationship length influences sexual satisfaction through its effects on desire and sexual frequency. Desire tends to decrease over time in relationships, even when controlling for the presence of children in the home (Impett et al., 2014). Additionally, relationship length predicts sexual frequency better than age such that older adults in new relationships report an increase in sexual frequency (Impett et al., 2014). Although both desire and frequency might decline in midlife relationships, it is possible that other factors associated with midlife such as sexual wisdom mitigate the negative effects on sexual satisfaction.

Relationship duration also affects the perception and presence of sexual rewards and costs, thereby impacting satisfaction according to the IEMSS (Lawrance & Byers, 1995). Habituation to a romantic partner can lead to a reduction in sexual rewards such that common rewards become less meaningful (Impett et al., 2014). Although long-term relationships might produce feelings of comfort and stability, these same qualities can create drops in excitement regarding sexual behaviors (Impett et al., 2014). Longer relationships can also create overfamiliarity with sexual interactions (Impett et al., 2014). Furthermore, sexual satisfaction is more strongly associated with sexual costs in long-term relationships, whereas it is associated with more global appraisals in short-term relationships (MacNeil & Byers, 2009). This finding suggests the elevated significance of

sexual rewards and costs in the context of long-term relationships, which are prevalent among women in midlife.

Sexual Functioning

Sexual functioning is another aspect of relationships that might influence sexual satisfaction, and involves physical, psychological, sociocultural, and interpersonal aspects of an individual's ability to respond to sexual interactions (Thomas & Thurston, 2016). The most widely used measure of female sexual function is the Female Sexual Function Index (FSFI), which measures desire, arousal, lubrication, orgasm, pain, and satisfaction (Wiegel et al., 2005). It should be noted that this measure includes sexual satisfaction as part of its overall construct. Thus, many studies examining the effects of sexual function on sexual satisfaction have conflated findings, and it is important to consider this limitation when examining the research.

Better sexual functioning is generally related to greater sexual satisfaction in women (Dundon & Rellini, 2010; Heiman et al., 2011; Henderson et al., 2009; Velten & Margraf, 2017). This relationship may be especially relevant for middle-aged women, given that the prevalence of sexual dysfunction is highest in midlife (Thomas & Thurston, 2016). In one study, sexual functioning explained most of the variance of sexual satisfaction in a middle-aged women sample (Dundon & Rellini, 2010). Furthermore, the impact of greater sexual functioning, as measured by desire, arousal, lubrication, and orgasm, on higher sexual satisfaction may be more pronounced in women than in men (Heimen et al., 2011). Partners' sexual functioning also contributes to midlife women's sexual satisfaction. Women's satisfaction, however, may be more

related to partners' sexual distress, rather than sexual functioning (Velten & Margraf, 2017).

These relationship aspects have a substantial influence on satisfaction in this population, but it is important not to forget the social systems in which these relationships occur. The exosystem, the next level of the ecological framework, is critical to evaluate how broader social aspects and roles might boost our understanding of middle-aged women's sexual satisfaction.

Exosystem Predictors of Sexual Satisfaction

The exosystem of sexual satisfaction is comprised of social networks and social status, such as socioeconomic status (SES), social support, parenthood, and caregiving roles. These variables are more peripheral to the experience of sexual satisfaction, such that they do not involve individual-level or intimate relationship-level constructs, but still exert an impact on the overall experience of sexual satisfaction.

Socioeconomic Status (SES)

Higher SES is related to greater sexual satisfaction, and it possible that SES exerts its influence on satisfaction through its impact on wellbeing, stress, and relationship patterns (Sánchez-Fuentes et al., 2014). For example, the proportion of household income earned by the female in heterosexual relationships has been found to be predictive of positive sexual satisfaction, which is likely due to a more equal distribution of work and power (Velten & Margraf, 2017). In this way, SES factors may influence satisfaction through perceptions of equality and power in intimate relationships.

SES may also affect satisfaction through its protective properties. In Henderson et al.'s (2009) study on heterosexual and lesbian/bisexual women's satisfaction, SES was

correlated with many variables that predict satisfaction, but only remained a significant factor in the lesbian/bisexual model. SES possibly acts as a protective factor against stress such that it is more relevant to the lesbian/bisexual group, who do not receive as much institutional support and have less combined incomes than heterosexual couples (Henderson et al., 2009). SES may similarly act as a protective factor for midlife women in relationships. When middle-aged women encounter stressful life experiences such as menopause or shifting family roles, SES may provide a buffer in the ultimate effect on sexual satisfaction.

Social Support

Social support, defined as an individual's appraisal of support, feelings of belonging, and tangible support, is related to higher sexual satisfaction, as well (Cohen et al., 1985; Sánchez-Fuentes et al., 2014). Social support is associated with enhanced sexual engagement and enjoyment in middle-aged women after accounting for menopausal stage (Hess et al., 2009). Additionally, middle-aged women's social relationships remain significant predictors of satisfaction, even after marital status is included in sexual satisfaction models (Hess et al., 2009). This reveals how social relationship quality is a crucial aspect of satisfaction, regardless of the nature of women's intimate relationships. This study did not include a measure of relationship satisfaction, however (Hess et al., 2009). Transitions into midlife may be accompanied by lower social support, such as having smaller networks that are geographically farther away and having less contact with social supports (Ajrouch et al., 2005). Given that social support appears to play a significant role in the sexual satisfaction of middle-age women, it is critical to evaluate sexual satisfaction in this population within the context of social support

available.

Parenthood

Having children affects relationship and sexuality variables that are known to relate to satisfaction, such as sexual frequency. For example, having children in the home is associated with reduced relationship satisfaction and lower sexual functioning, largely due to feelings of fatigue (Ahlborg et al., 2005). Having children can also create parenting stress, which reduces sexual satisfaction, as well (Leavitt et al., 2017). The majority of research on parenthood and its effects on relationship and sexual satisfaction have not been done in midlife samples, despite the fact that middle-aged women are increasingly likely to be living with children in the home (Blieszner & Roberto, 2006; Infurna et al., 2020). More research is needed to better understand the effects parenthood might have on this specific population.

The presence of children in the home also has implications for the Interpersonal Exchange Model of sexual satisfaction by altering perceptions of rewards and costs in relationship dynamics (Lawrance & Byers, 1995). Lawrance and Byers (1995) found that perception of unequal costs in relationships had a more negative effect on sexual satisfaction in individuals who had children, in comparison to those who did not. The authors suggest that cost equality in relationships may function differently for those who have children, versus those who do not (Lawrance & Byers, 1995).

Midlife women experience a range of situations and transitions with regard to children, for example, having young children in the home, experiencing children leaving the home, and having adult children come back into the house. Given how the presence

of children may influence relationship and sexual satisfaction, research should investigate how these various situations and transitions may influence midlife women, specifically.

Caregiving Status

One prevalent role for middle-aged women is caring for a family member (Infurna et al., 2020). Because stress is associated with decreased sexual satisfaction, caregivers may be especially vulnerable to reduced satisfaction due to the immense stress associated with the caregiving role (Sánchez- Fuentes et al., 2014; Schulz & Monin, 2012). More than 65 million people in the United States care for a disabled, ill, or older family member or friend, and the majority of these caregivers are middle-aged women (Caregiver Action Network, 2017). Although 70% of family caregivers care for an adult over 50 years old, there is a lack of research on how this pervasive experience affects sexual satisfaction (Caregiver Action Network, 2017). The available literature on the sexual impact of family caregiving pertains to caregiving for a child or a partner, and some findings may be applicable to understanding the possible effects of caregiving for an older adult.

Caregiving for Ill or Disabled Children

Caregiving for a sick or disabled child has been found to negatively affect parents' sexual relationships (Aylaz et al., 2012; Lavee & Mey-Dan, 2003). This may be due to the energy required of parents to care for these children, which leaves less energy for sex (Lavee & Mey-Dan, 2003). This energy expenditure can also create fatigue and depression, further reducing sexual satisfaction (Lavee & Mey-Dan, 2003). Interestingly, sexuality was the relationship component that was harmed most in one study evaluating parents caring for children with cancer, whereas other relationship aspects, such as

communication and trust, increased throughout the experience of caregiving (Lavee & Mey-Dan, 2003). This finding suggests that the usual contributors to sexual satisfaction may work differently for those in the caregiving role. Experiences of relationship functioning among parents caring for sick children tend to hinge on perceptions of spousal support and involvement in caring for the child (Barbarin et al., 1985). Partners' support may be critical in maintaining sexual satisfaction in the face of caregiving stress, including for middle-aged women caring for older adults.

Spousal Caregivers

Non-Dementia Caregiving. Caregiving for a partner with an illness or disability can negatively affect relationship and sexual functioning (Li et al., 2013; Svetlik et al., 2005; Zhou et al., 2011). The available evidence points to decreases in marital satisfaction and increases in stress and depressive symptoms, all of which are predictors of reduced sexual satisfaction (Li & Loke, 2014; Li et al., 2013). The majority of research on non-dementia spousal caregiving focuses on cancer. Female caregivers of spouses with cancer tend to perceive greater levels of negative caregiving experiences in comparison to male caregivers, including lower physical and mental health, reduced life satisfaction, and decreased marital satisfaction (Li et al., 2013).

Caregiving for a partner can also lead to feelings of relationship loss, in which the caregiver feels less happy or emotionally close to their partner (Svetlik et al., 2005). Although this is true across a range of partner illnesses and disabilities, this is especially pertinent when care recipients are more cognitively impaired (Svetlik et al., 2005). This is likely due to the greater assistance required of caregivers for these individuals, such as help with activities of daily living (ADLs) (Svetlik et al., 2005). Middle-aged women

caregivers may similarly be more stressed caring for an older adult with cognitive impairment.

Dementia Caregiving. Spousal caregivers of partners with dementia experience decreased sexual satisfaction and sexual activity (Dourado et al., 2010; Nogueira et al., 2013; Nogueira et al., 2017; Nogueira et al., 2015; Youell et al., 2016). Dementia can influence sexual activity and meaning in a variety of ways. For example, dementia can affect one's ability to understand sexual advances and behaviors, and is also associated with increased sexual dysfunction, such as erectile dysfunction in men (Dourado et al., 2010; Zeiss et al., 1996).

Decreased sexual satisfaction in this population has been associated with the severity of the partner's dementia, with partners of individuals with mild to moderate dementia experiencing more dissatisfaction than those with partners with moderate to severe dementia (Dourado et al., 2010). This discrepancy is present in both male and female caregivers and may be due to the novelty of the transitions experienced, such as new losses in intimacy and recent changes in spouse characteristics (Dourado et al., 2010). Thus, it is probable that the time and ability to adjust to new circumstances has an effect on sexual satisfaction.

Caregiver burden, the feeling of not being able to handle the stressors associated with the caregiving role, is also associated with sexual dissatisfaction in a population of spousal dementia caregivers (Dourado et al., 2010). This finding is especially true for female caregivers, given that they tend to receive less support in this role than male caregivers (Dourado et al., 2010). Caregiver burden is also associated with stress and

depression in dementia caregivers, which may have an additional negative effect on sexual satisfaction (Davies et al., 2012).

Caregiving for a spouse with dementia may also negatively affect sexual satisfaction due to the taking on of multiple roles (Dow & Malta, 2017). Dow and Malta (2017) suggest, for example, that the reduction in sexual satisfaction among spousal caregivers may be a result of deprioritizing sexual intimacy in the face of upholding so many family and social roles. It is likely that middle-aged women caring for older adults will experience similar negative effects on their sexual satisfaction.

Implications for Intergenerational Caregiving

There has been a drastic increase in the need for intergenerational support as individuals live longer. The majority of these caregivers are women in middle age, who also have jobs and children to look after; these caregivers make up the "sandwich generation" (Alzheimer's Association, 2011; Steffen et al., 2008).

The research on caregiving for children and spouses suggests that sexuality may be impacted greatly by caregiving experiences such as role transitions, burden, and stress. Dourado and colleague's (2010) research on dementia transitions can be applied to middle-aged caregivers of older adults, such that it is possible that the recentness of taking on a caregiver role may affect satisfaction. Multiple roles and caregiver burden have implications for intergenerational caregivers, as well. Just like spousal caregivers, caregivers of older adults are prone to experiencing burnout and must take on many responsibilities, such as caring for children while also caring for older adults (Schulz & Monin, 2012). Given that so many midlife women provide care for an older family member, it is important that future research investigate how intergenerational caregiving

influences sexual satisfaction in order to truly understand the sexual experiences of this population.

The exosystem-level predictors of social support, SES, parenthood, and caregiving status can play a large role in middle-aged women's sexual satisfaction. Although these factors do not directly involve sexual encounters, they can greatly impact personal and relationship functioning. These constructs interact with other previously discussed predictors of sexual satisfaction, as well as those within the final level of the ecological model, the macosystem.

Macrosystem Predictors of Sexual Satisfaction

The macrosystem of sexual satisfaction includes institutional and societal factors that have an impact on sexual satisfaction. Constructs related to this level are less studied in the field of sexual satisfaction. Religion, however, has been examined in relation to sexual satisfaction more consistently than other variables. In Sánchez-Fuentes et al.'s (2014) review, religion's effects on sexual satisfaction varied across studies. For example, some researchers found that greater religious belief was related to lower satisfaction in white participants, and other researchers found no clear differences in satisfaction depending on religion (Davidson et al., 1995; Higgins et al., 2010; Sánchez-Fuentes et al., 2014). Having a nonreligious childhood has also been found to relate to higher sexual satisfaction in women (Haavio-Mannila & Knotula, 1997). It is important for future studies to study religiosity and sexual satisfaction in a middle-aged sample, and to clearly define how "religiosity" is measured. For example, previous studies have looked at degree of belief, religious upbringings, and particular practices. A construct

such as religious identification might capture the importance of religion and religious practices to individuals and how these might sexual satisfaction.

The available research suggests that the microsystem, mesosystem, exosystem, and macrosystem interact to create unique experiences of sexual satisfaction. This ecological framework allows for a more comprehensive understanding of sexual satisfaction in a population of midlife women. The literature also suggests the importance of investigating the effects of caregiving, including specific intergenerational caregiving, on the sexual satisfaction in this population. The investigation of sexual satisfaction in this population also has important clinical implications; for example, it is important for providers working with middle-aged women on sexual satisfaction to acknowledge aspects of relationship functioning and other contextual factors in treatment. A more detailed understanding of sexual satisfaction using an ecological framework can help direct the focus to these potential interacting factors.

Current Study Rationale and Aims

An ecological framework recognizes how personal, social, and contextual factors are tied to women's sexual satisfaction, while also accounting for the variety of models of sexual satisfaction that exist in the literature. An ecological model is especially pertinent to middle-aged women due to specific life experiences that this population is likely to face, such as long-term relationships, changes in sexual function, and familial role shifts (Ahlborg et al., 2005; Dundon & Rellini, 2010; Impett et al., 2014). Given that sexual satisfaction is an integral part of overall wellbeing and health, it is imperative to better understand what contributes to sexual satisfaction in middle-aged women (Impett et al., 2014; Sánchez-Fuentes et al, 2014).

It is also important to examine how caregiving for an older adult might affect sexual satisfaction, given the prevalence of this role in this population (Alzheimer's Association, 2011). Oftentimes, middle-aged women who are caring for an older adult are part of the "sandwich generation," and must also deal with the demands of caring for children, in addition to maintaining jobs (Alzheimer's Association, 2011; Steffen et al., 2008). This group of women experience stressful demands on their time and energy, while also navigating the difficult emotions that often accompany seeing a vulnerable parent or older friend suffer. Informal caregivers are prone to experiencing stress, depression, and other psychological disorders that are known to affect sexual satisfaction (Crespo et al., 2005). Given the burden associated with the caregiving role, it is necessary to understand how caregiving contributes to middle-aged women's sexual satisfaction.

Research aim 1

There is currently no existing research testing an ecological model of sexual satisfaction in a population of midlife women in relationships, despite the research supporting a great number of variables within each ecosystem level affecting this population's satisfaction (Henderson et al., 2009; Sánchez-Fuentes et al., 2014). The first aim of this study was to test the fit of an ecological model as articulated by Sánchez-Fuentes and colleagues (2014) for understanding factors that influence the sexual satisfaction of midlife women in relationships.

Hypothesis I

An ecological model - including the macrosystem level variable of religiosity, the exosystem level variables of SES, social support, and parenthood, the mesosystem level variables of relationship satisfaction, affectual solidarity, relationship length, and sexual

functioning, and the microsystem level variables of age, negative affect, and physical health and functioning - together significantly predict sexual satisfaction in a national sample of women in midlife.

Research aim 2

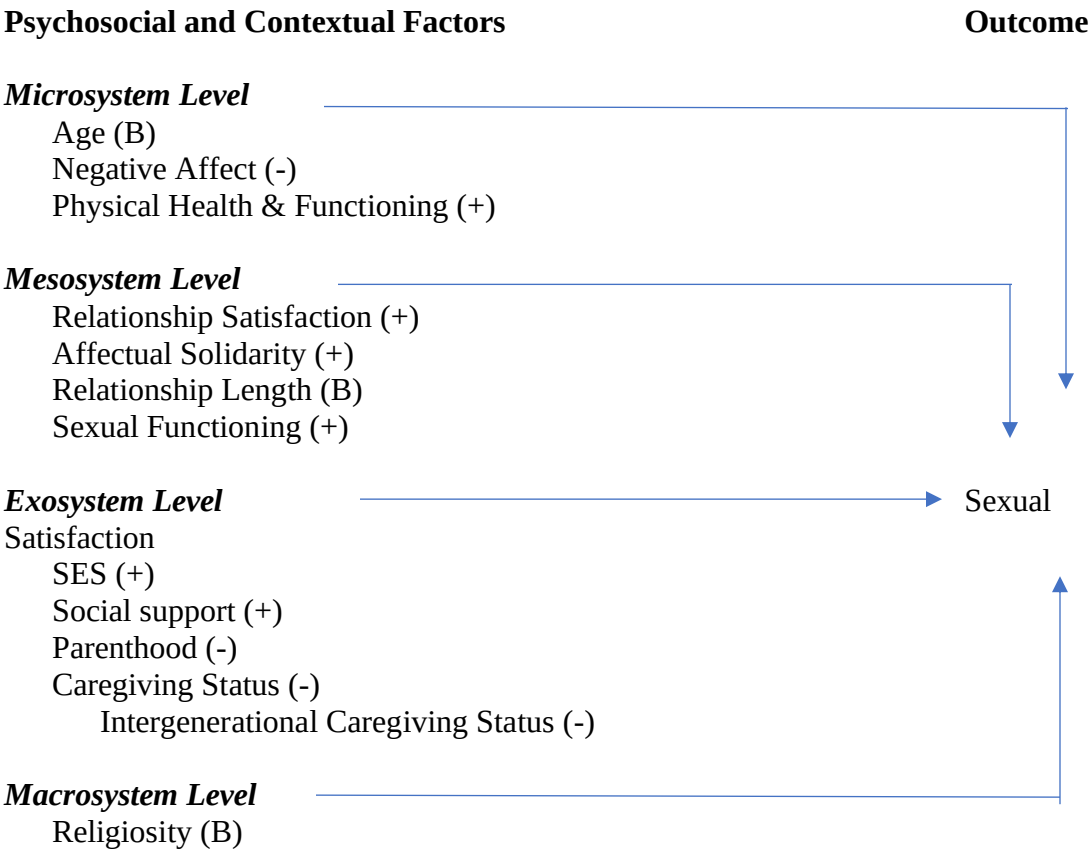
The second aim of this study was to examine whether attention to caregiving responsibilities adds to the predictive power of this model, and in particular, whether intergenerational caregiving has an effect on sexual satisfaction. Research suggests that caring for an ill or disabled child, as well as caring for a partner with illness or dementia, significantly reduces sexual satisfaction. This relationship, however, has not been tested within an ecological framework (Dourado et al., 2010; Lavee & Mey-Dan, 2003; Li et al., 2013). Furthermore, there is no known research on the effects of intergenerational caregiving on sexual satisfaction, despite the fact that so many middle-aged women take on this role (Alzheimer's Association, 2011). Thus, this study examined caregiving's impact on sexual satisfaction within an ecological model, and focused explicit attention on the effects of intergenerational caregiving. Figure 2 offers a view of this proposed model.

Hypothesis 2a

Having been a family caregiver within the past 12 months adds to the predictive power of the existing ecological model on sexual satisfaction, with caregiving associated with decreased satisfaction.

Hypothesis 2b

Intergenerational family caregiving specifically adds to the predictive power of the existing model, associated with decreased satisfaction.



B = Either direction. Caregiving status, and specifically being an intergenerational caregiver, will be tested as a potential predictor

Figure 2. Ecological Model of Sexual Satisfaction for Studying Midlife Women in Relationships

Research aim 3

The third aim of this study was to further explore the relationship between intergenerational caregiving and sexual satisfaction, if caring for an older adult did significantly contribute to the model. The nature and intensity of the caregiving role likely impacts levels of satisfaction, based on research evaluating effects on caregiver fatigue, burden, and depression, all of which reduce sexual satisfaction (Davies et al., 2012; Dourado et al., 2010; Lavee & Mey-Dan, 2003). Additionally, prior research has

shown that perceived partner support and involvement contributes to relationship functioning in caregivers of children (Barbarin et al., 1985). This suggests a potential buffering effect of partner support on satisfaction in intergenerational caregivers. This study also sought out to examine the potential mechanism of negative affect in these relationships.

Hypothesis 3a

The extent of the intergenerational caregiving role, including whether the care recipient lives in the household, how many hours per week the caregiver provides care, and the number of caregiving responsibilities, is negatively associated with sexual satisfaction, above and beyond caregiving status.

Hypothesis 3b

The relationship between the extent of intergenerational caregiving and sexual satisfaction is moderated by levels of perceived partner support, such that the relationship between intergenerational caregiving and sexual satisfaction is strongest in those caregivers who perceive less partner support. Conversely, caregivers who perceive greater partner support show a weaker relationship between the extent of intergenerational caregiving and sexual satisfaction.

Hypothesis 3c

Negative affect partially mediates the interaction effect of caregiving and partner support on sexual satisfaction. Lower perceived support predicts stronger associations between caregiving and sexual satisfaction due to higher levels of negative affect.

Methods

Source of the Data

Midlife in the United States (MIDUS) data were chosen for these research questions for many reasons. First, MIDUS contains a large sample of middle-aged women in relationships, which is a population that can be difficult to recruit. The MIDUS sample is also nationally representative, capturing a diverse range of participants from different geographical areas in the United States. MIDUS was conceived by a multidisciplinary team, and thus can be used to examine adult development from a variety of research disciplines and protocol types (Radler, 2014). This approach is useful in studying an ecological model of sexual satisfaction; MIDUS includes an array of constructs representing each level of the model, including macrosystem-level variables that are often left out in sexual satisfaction research. The inclusion of both caregiving and sex-related variables contributes new knowledge to the field, since there is no known existing study on the impact of intergenerational caregiving on sexual satisfaction.

The second wave of MIDUS data (MIDUS-II) was chosen from the three existing waves due to considerations of sample size and relevance to the current cohort of middle-aged women. MIDUS-II data were collected between 2004 and 2006. Although the third wave (MIDUS-III) contains the most recent cohort of middle-aged women, with data collected between 2013 and 2014, there were far fewer participants in this wave.

Procedures of Obtaining the Original Dataset

MIDUS data and documentation are available to the public at the Inter-university Consortium for Political and Social Research (ICPSR) website. All data and codebooks can be downloaded from the ICPSR homepage. This study received approval from the

University of Missouri – St. Louis' Institutional Review Board to use MIDUS-II and MIDUS-III data.

Procedures of Data Collection in the Original Dataset

Participants were recruited with random digit dialing (RDD) in order to obtain a nationally representative sample. Specific metropolitan areas were oversampled to ensure racial and geographic representativeness (Radler, 2014). Siblings of original RDD responders were also recruited to participate. Participants were eligible for MIDUS if they were non- institutionalized, English speaking adults, aged 25 – 74. RDD respondents were informed that the survey was designed to study health and wellbeing during midlife and that the study was being conducted through the Harvard Medical School (Ryff et al., 2017).

All participants completed 2 self-administered questionnaires and a phone interview at each wave. Phone interviews were 30 minutes long. A subset of these participants also completed other related projects, including an 8-day daily diary of stress, cognitive assessments, biomarker data, and brain imaging (Radler, 2014).

Data from the original sample (MIDUS-1) were collected between 1995-1996, the second wave (MIDUS-II) was collected between 2004 and 2006, and the third wave (MIDUS-III) was collected between 2013-2014. New samples were included at each wave, in addition to longitudinal participants who were successfully re-contacted (Radler, 2014). In MIDUS-I, 7,108 individuals participated (51.1% female, mean age = 46.4). In MIDUS-II, 4,963 individuals participated, 69.8% of which were from MIDUS-I. The MIDUS-III sample is comprised of 3,294 individuals, 46.3% of whom were re-contacted

from MIDUS-I. Attrition has been analyzed and found not to fundamentally bias the study sample representativeness (Radler & Ryff, 2010).

The data in every wave include participants' demographics and background information, such as income, household composition, gender, age, education, race and ethnicity, and marital status. The MIDUS project involves around 20,000 variables spanning the domains of physical health, mental health, occupation, children, living arrangements, caregiving, life satisfaction, sexual health and behaviors, and experiences of discrimination. Non-survey data were obtained at each wave of data that includes cognitive assessments, daily stress diaries, biomarkers, and neuroscience data.

Participants

The present study analyzed an ecological model of sexual satisfaction using existing data from the second wave of the Midlife in the United States (MIDUS) study. MIDUS is a national, longitudinal study on health and wellbeing that includes English-speaking, non-institutionalized adults in the United States. Participants in the present study were 1,411 females selected from this dataset who reported being in committed marriage or marriage-like relationships, and who were also between the ages of 40 – 70 at the time of data collection. This age range was chosen due to its focus on middle-aged women, usually defined as ages 45-65, while also allowing an ability to capture some women for any secondary longitudinal analysis, if needed in future related studies (i.e., who may be middle-aged in one wave of data, but not the other).

Materials

Participants completed all the selected measures as part of the self-administered questionnaire and phone interview. For the purposes of the current project, constructs in

each ecological level were chosen as determined by (1) the strength of the effect within the literature and/or the replicated finding of the effect, (2) the match between the construct in the literature and the quality of the MIDUS measures, and (3) the consideration of potential multicollinearity issues.

Age

Participants entered their date of birth, and an age variable was created from subtracting the date of birth from the date of respondent data entry.

Relationship Status

Relationship status was determined by two items. One question asked participants if they were currently married, separated, divorced, widowed, or never married. Another question asked unmarried participants whether they were currently living with someone in a steady, marriage-like relationship. Participants who responded "Married" to the first question or "Yes" to the second item were coded as in a relationship (1= in a relationship; 0= not in a relationship).

Demographics

Information was collected on participants' sexual orientation, ethnicity, employment status, occupation, religious affiliation, number of children, care recipient condition, and sexual frequency. Due to the nature of the data, information on religion was limited to religious vs. not religious, and data could not be analyzed with regard to care recipient condition or occupation, as described later.

Religiosity

Religiosity was measured using a Religious Identification scale (Ryff et al., 2017). Participants rated how important religion is to them on a seven-item scale with

response options that range from (1) Very to (4) Not at all. This scale includes items such as “How religious are you?”, “How important is religion in your life?” and “How closely do you identify with being a member of your religious group?” All items were reverse-coded, such that a higher score represents higher religiosity. A total score was constructed by calculating the sum of the values in the scale, with missing values imputed with the mean value of completed items. This scale has demonstrated high reliability in the MIDUS-II total sample (α=.90) (Ryff et al., 2017). It also showed good reliability in this specific study’s sample (α=.89).

SES

Socioeconomic status was measured by two individual items assessing (1) the participant’s total household income and (2) highest level of education completed.

Social Support

Social support was measured using a revised version of the Friend Support scale (Schuster et al., 1990). This four-item scale asks participants to rate the amount of care and understanding they receive from their friends. Items include statements such as, “How much do your friends really care about you?” and “How much can you rely on them for help if you have a serious problem?” Responses range from (1) A lot to (4) Not at all. Responses were reversed coded so that higher scores reflect greater social support, and a total score was constructed by calculating the mean of the items. This scale has demonstrated high reliability in the MIDUS-II total sample (α=.88), as well as in the current study’s sample (α=.89) (Ryff et al., 2017).

Parenthood

The presence of children in the home was evaluated by items assessing the number of children living at home and the number of adult children living at home. Given that the majority of research demonstrates that the presence of children in the home affects sexual satisfaction, as opposed to the number of children or relationship with children, a Yes/No variable was created to signify the presence of any children in the home (Ahlborg et al., 2005; Lawrance & Byers, 1995; Leavitt et al., 2017). Due to distribution issues detailed later, this variable only included the presence of adult children in the home in hypothesis testing.

Relationship Satisfaction

Relationship satisfaction was measured using a single item that asked participants to rate "your marriage or close relationship these days" on a scale from (0) The worst possible marriage or close relationship to (10) The best possible marriage or close relationship. This is a domain-specific item from a broader Life Satisfaction scale (Prenda & Lachman, 2001). Due to distribution issues described in the results section, this variable was used in descriptive analyses but not in hypothesis testing.

Affectual Solidarity and Partner Support

Affectual solidarity was measured with the Spouse/Partner Affectual Solidarity scale, which is comprised of revised versions of the Partner Support subscale and a Partner Strain subscale (Schuster et al., 1990). The Partner Support subscale is made up of six items assessing partner support, such as "How much does your spouse or partner really care about you?" and "How much can you open up to him or her if you need to talk about your worries?" Respondents answered on a scale from (1) A lot to (4) Not at all.

All items have been reverse-coded, so that high scores reflect high support. The Partner Strain scale is made up of six items such as “How often does your spouse or partner make too many demands on you?” and “How often does he or she criticize you?” Respondents answered on a scale from (1) Often to (4) Never. A total Affectual Solidarity score was created by calculating the mean of all items, with higher scores reflecting higher levels of partner affectual solidarity. The partner support subscale, specifically, was proposed to measure partner support for research aim 3. The Spouse/Partner Affectual Solidarity scale (α=.91) and the Partner Support subscale (α=.90) have shown high reliability in the MIDUS-II sample (Ryff et al., 2017). The Spouse/Partner Affectual Solidarity scale similarly showed high reliability (α=.91) in the current study’s sample.

Relationship Length

Married participants identified the date they were married. Participants who were not married, but who were living with someone in a “steady, marriage-like relationship” were asked for the length of cohabitation. Marriage length was calculated by subtracting the date of marriage from the date of MIDUS data, and a new “Relationship Length” variable was created that identified length of marriage or length of cohabitation in years.

Sexual Functioning

Sexual functioning was determined by two items. One item asked how often pain or discomfort is experienced in sexual interactions on a four-point scale, from (1) Never to (4) Always. The other item asked how often pleasure is experienced in sexual interactions, on a four-point scale from (1) Never to (4) Always. Answers to the first item were reverse-coded, and a total sexual functioning score was determined by the mean of these two responses. Although these items do not fully capture sexual function as it is

usually defined by the FSFI, they were the most representative options of sexual function within the dataset.

Negative Affect

Negative affect was measured using the Negative Affect scale (Mroczek & Kolarz, 1998). This scale is comprised of six items that ask the respondent how much of the time they feel certain emotions, such as "hopeless," "worthless," or "nervous." Participants answered on a scale from (1) All of the time to (5) None of the time. Items have been reverse coded so that higher scores reflect greater negative affect, and a total score was constructed by calculating the mean of item values. This scale has demonstrated high reliability within the MIDUS-II total sample (α=.85), as well as in the current study's specific sample (α=.85) (Ryff et al., 2017).

Physical Health and Functioning

Physical health was evaluated using a single item that asked participants to rate their physical health from (1) Excellent to (5) Poor. This item was reverse coded so that higher scores represent greater perceived health. This item assesses perceived physical health, as opposed to other measures of physical health and functioning, due to research showing that both fitness level and body image contribute to sexual satisfaction (Penhollow & Young, 2008; Weaver & Byers, 2006).

Caregiving

Participants were asked whether they had given personal care to someone in the past 12 months and to whom they had given care most. These items determined caregiving status, as well as specific intergenerational caregiving status. Participants who responded "Yes" to giving care in the last 12 months were coded as caregivers

(1=caregiving; 0= not caregiving). Participants who identified caring for a father, mother, grandfather, grandmother, father-in-law, mother-in-law, or those who responded with "Other" and specified an older adult such as aunt, uncle, or older friend, were coded as intergenerational caregivers (1=intergenerational caregiver; 0=other caregiver).

Other items assessed how many caregiving responsibilities the participant engaged in. Items included Yes/No questions such as "Because of [his/her] limitations [do/did] you provide [him/her] personal help with bathing, dressing, eating, or going to the bathroom?" and "Because of [his/her] limitations [do/did] you provide [him/her] going around inside the house or going outside?" Other items asked whether the care recipient lives in the participant's household, and for weekly hours of care provided. A composite variable was created to reflect extent of caregiving for intergenerational caregivers, by summing Z-scores of the individual variables. However, this variable was not used due to a lack of support for caregiving hypotheses, as detailed in the results section.

Sexual Satisfaction

Sexual satisfaction was measured using a sexual quality of life (SQoL) single item that asked participants to rate "the sexual aspect of your life these days" on a scale from (0) The worst possible situation to (10) The best possible situation. This item is based on Campbell, Converse, and Rodgers' (1976) theoretical model of life quality and is a domain- specific item from a broader Life Satisfaction scale (Prenda & Lachman, 2001). Although it would have been preferable to use a scale rather than a single item, the wording of other sex- related items did not reflect sexual satisfaction in a similar way (e.g., "rate the amount of control you have over the sexual aspect of your life these

days"). Additionally, this item has been used successfully by other researchers evaluating sexual satisfaction the MIDUS midlife sample (Carr et al., 2013; Forbes et al., 2017; Thomas et al., 2015).

Results

Analyses were conducted using the Statistical Packages for the Social Sciences (SPSS). A priori power analyses using G*Power 3.1 indicated that detection of a moderate effect would require a sample size of at least 127 participants.

Preliminary Analyses

Missing data

A Missing Value Analysis was used to perform Little's MCAR test and determine whether missing data could be considered missing completely at random (MCAR). This test rejected the null hypothesis that the missing data were random, and therefore, one could not assume that the missing data were MCAR. This result suggests there was a systematic bias in the sample. An analysis of the variables revealed that there were certain variables and scales with a large amount of missing data; for example, 26% of participants had missing data in sexual functioning variables, 17% of participants had missing data on sexual satisfaction, 19% of participants had missing data on total household income, 15% had missing data on religiosity, and 15% had missing data on social support. There were other variables with zero missing data, such as physical health and functioning, age, and caregiving status. Complete information on missing data is presented in Table 1, contrasting for the total sample and intergenerational caregivers, specifically. Participants seemed less likely to answer questions related to more personal or sensitive topics, such as sexual functioning and sexual satisfaction, as opposed to less

sensitive topics such as age, education, and length of cohabitation with partner. Additionally, participants appeared more likely to answer questions that were asked toward the beginning of the survey, rather than toward the end.

Due to the nature of missing data, multiple imputation was used to replace missing data with substituted values. A Mersenne Twister was utilized as a random number generator and five simulations of the data were created. The automatic function of multiple imputation was used, such that a monotone method was utilized for data with monotonicity, and a Markov chain Monte Carlo method was used for variables missing at random. This method was used for all proposed hypothesis testing analysis variables.

Table 1

Missing Data: Contrasting for Total Sample and Intergenerational Caregivers (Int.CG)

Variable	Total: Missing *n(%)*	Int.CG: Missing *n(%)*
Sexual Satisfaction	246 (17.4%)	21 (18.3%)
Religious Identification	213 (15.1%)	18 (15.7%)
Total Household Income	274 (19.4%)	24 (20.9%)
Highest Level of Education Completed	3 (0.2%)	0 (0%)
Social Support	215 (15.2%)	18 (15.7%)
Children in the Home	0 (0%)	0 (0%)
Adult Children in the Home	108 (7.7%)	7 (6.1%)
Relationship Satisfaction	234 (16.6%)	21 (18.3%)
Affectual Solidarity	224 (15.9%)	20 (17.4%)
Relationship Length	4 (0.3%)	0 (0%)
Sexual Functioning	369 (26.2%)	30 (26.1%)
Age	0 (0%)	0 (0%)
Negative Affect	216 (15.3%)	18 (15.7%)
Physical Health and Functioning	0 (0%)	0 (0%)
Caregiving Status	0 (0%)	-
Intergenerational Caregiving Status	0 (0%)	-

N= 1,411*; N*= 115 for Intergenerational CG Sample

Outliers

Mahalanobis' distances were calculated to identify multivariate outliers. Variables from the first two sets of hypotheses were used to determine these, as well as for all further preliminary analyses, given that later hypotheses would only be completed if these hypotheses were correct. Based on these variables, six outliers were identified as outside the acceptable range of |37.70| [X_2 (15), alpha level .001]. These cases were removed.

Univariate outliers were identified by analyzing z-scores and generated boxplots. Many of the variables with the most extreme univariate outliers were later either replaced, removed, or transformed due to other normality issues with these variables. These variables included total household income, children in the home, relationship satisfaction, and negative affect. Additionally, linear regression analyses are more robust to the presence of univariate outliers, and univariate outliers are expected in larger datasets, such as this one, and more likely to represent true and important information regarding the population (Leys et al., 2019; Orr et al., 1991). Therefore, no cases were removed solely due to univariate outlier status. The final sample resulted in 1,405 participants.

Statistical assumptions

Skewness and Kurtosis analyses, as well as histogram distributions, were utilized to determine univariate normality. The variables of sexual satisfaction, religiosity, highest level of education completed, social support, adults in the home, caregiving status, affectual solidarity, relationship length, sexual functioning, age, and physical health and functioning all fell within the acceptable range of -2 to 2 on Skewness and Kurtosis measures. This more flexible range of Skewness and Kurtosis was chosen due to the large sample size, given that regression models are usually more robust to these violations of normality when the sample size is larger (Bohrnstedt & Carter, 1971; Ghasemi & Zahediasl, 2012). The variables of total household income (Skewness = 1.35; Kurtosis =2.251), negative affect (Skewness = 1.867; Kurtosis = 4.386), relationship satisfaction (Skewness = -1.424; Kurtosis = 2.181), children in the home (Skewness = -16.727; Kurtosis = 278.193), and intergenerational caregiving status (Skewness = .082; Kurtosis

= -2.012) did not meet these assumptions of acceptable skew and kurtosis ranges. Of these variables, two were successfully transformed; a square root transformation was used on total household income, resulting in a new Skewness of -.104 and Kurtosis of .532. A log 10 transformation was used to transform negative affect, resulting in a Skewness of .945, and a Kurtosis of .414. The remainder of this results section refer to these transformed variables. Relationship satisfaction was dropped as a variable in further analyses due to its high correlation with affectual solidarity. Children in the home was also dropped as a variable due to its extreme skew and kurtosis, and a resulting lack of confidence that this variable was trustworthy. The presence of children in the home was changed to only be assessed with the variable of adult children in the home. Finally, intergenerational caregiving status was not transformed due to its minimal kurtosis, lack of skew, and lack of optimal transformation. Shapiro-Wilk statistics were not used to determine further normal distribution beyond these statistics, due to findings that Shapiro-Wilk statistics may detect normality deviations that are unlikely to influence analyses in large sample sizes (Meyers et al., 2006).

The correlations among all study variables in the first two sets of hypotheses were analyzed for multicollinearity using bivariate correlations and these are presented in Table 2. A high correlation was found between affectual solidarity and relationship satisfaction (r = .782, p <.001). Therefore, relationship satisfaction was dropped from the model. Affectual solidarity is a scale and therefore likely yields greater reliability and validity than the single item of relationship satisfaction. Additionally, there were slight issues with normality with the relationship satisfaction variable. Finally, the items in the affectual solidarity scale likely reflect an important, and more specific, component of

overall relationship satisfaction, and this may be particularly true for women, given the different factors that contribute to perceptions of relationship satisfaction in women (Heiman et al., 2011).

Table 2

Correlations Among Relevant Variables (*N* = 1,411; *N*= 222 for Intergenerational Status only)

Measure	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Sexual Satisfaction	-													
2. Religious Identification	.07**	-												
3. Total Income	-.04	-.11**	-											
4. Highest Education	.01	-.01	.33**	-										
5. Social Support	.14**	.15**	.05	.11**	-									
6. Adult Children in Home	-.01	.03	.03	-.05	-.14**	-								
7. Affectual Solidarity	.50**	.-.01	-.00	-.01	.21**	-.03	-							
8. Relationship Length	-.04	.19**	-.18**	-.16**	.04	.04	.05	-						
9. Sexual Functioning	.42**	.02	.03	.01	.13*	-.01	.36**	-.07	-					
10. Age	-.06	.14**	-.25**	-.14**	.10**	-.16**	.11**	.64**	-.07	-				
11. Negative Affect	-.23**	-.06*	-.06	-.12**	-.26**	.07*	-.32**	-.09**	-.16**	-.11**	-			
12. Physical Health and Functioning	.12**	-.03	.24**	.26**	.18**	-.06*	.07*	-.12**	.08**	-.13**	-.38	-		
13. Caregiving Status	-.04	-.02	-.07*	-.02	-.04	.07**	-.05*	-.01	.01	-.01	.11*	-.06*		
14. Intergenerational CG Status	.06	.02	.08	-.09	.09	.03	.07	-.13	-.02	-.15*	-.04	.12	n/a	-

*p < .05, **p < .001

Bivariate scatterplots suggested that most variables, with the exception of affectual solidarity, did not have linear relationships with sexual satisfaction. These remaining variables were all analyzed for possible curvilinear relationships with sexual satisfaction. This was done by squaring each variable and testing each new squared variable separately in a final block of regression analyses, with the first block containing the hypothesized predictors for sexual satisfaction. Religiosity was found to have a curvilinear relationship with sexual satisfaction, producing a significant change in variance accounted for when added to the proposed regression analyses ($\Delta R^2 = .001$, $p < .05$). Therefore, further analyses used the transformed variable of religiosity squared to account for this curvilinear relationship. No other curvilinear relationships were found with this method. The following linear analyses may have underestimated the strength of the relationships between all other variables proposed and sexual satisfaction.

Scatterplots of predicted versus residual factors were examined for heteroscedasticity. Most plots were homoscedastic, although the plot for affectual solidarity and sexual satisfaction and the plot for sexual function and sexual satisfaction were both slightly heteroscedastic. Additionally, the plot for negative affect and sexual satisfaction was approaching heteroscedasticity. Overall, the assumptions of linearity were not fully met, while assumptions of heteroscedasticity and multicollinearity were mostly met.

Sample Characteristics

Participants' mean age was 53.32 years. The majority of the sample (93.2%) identified as Caucasian or White, and 2.8% identified as African American or Black. Most participants reported having either a high school diploma or GED (28.8%), some

college education, without a college degree (23.1%), or a college degree (19.1%). The majority of the sample identified as heterosexual (81.9%), although it should be noted that participants were only given the options of heterosexual, homosexual, or bisexual and a sizeable portion of participants (16.6%) did not answer this question. It is possible participants did not answer because they had a sexual orientation that fell outside the options provided to them. Seven hundred and seventy participants (54.8%) reported being currently employed. Specific occupation was not analyzed due to the large variety of occupations self-reported by participants. With regard to religious affiliation, this demographic category was changed to reflect religious versus not religious participants, given the large variety of self-reported religions and the difficulty inherent in categorizing these to affiliation groups. One thousand and fifty-five participants (75.1%) reported being religious. Participants reported having anywhere from zero to eleven children in total, with the average number of children being three.

These participant characteristics were considered in light of the corresponding census data with the dates of both the first and second waves of MIDUS data collection, as the majority of wave 2 participants were recruited at wave 1. The dates of these two waves included the time periods of 1995-1996 and 2004-2006. Census data for 2000 indicate that 75.1% of the population was White and 12.3% of the population was Black or African American (U.S. Census Bureau, 2000b). This sample is therefore a more homogenous sample than the population at the time. Additionally, 2000 census data indicate that 84% of women were high school graduates, whereas a greater majority of this sample had at least a high school diploma or GED in comparison (about 95%) (U.S. Census Bureau, 2000a).

The mean length of partner cohabitation was 25.49 years. The majority of the sample reported being married to their partner (94.2%), rather than being in marriage-like relationship. With regard to sexual frequency, 20.1% of the sample reported “having sex with someone” once a week, and 16.4% reported frequency of sex to be two or three times a month. Of the sample, 184 participants (13.1%) reported never having sex with someone in the past month. Care recipient condition for those providing care to someone was not available for analysis, given that this was a write-in item and was therefore difficult to properly categorize. A detailed description of sample characteristics can be seen in Table 3.

Table 3

Sample Demographics

Characteristic	*M* (range)	*SD*	N (%)
Age (years)	53.32 (40-70)	8.60	
Year survey taken	2004.08 (’04-’05)	0.27	
Race			
Caucasian/White			1,310 (93.2)
African American/Black			39 (2.8)
Native American / Alaskan			14 (1.0)
Asian			7 (0.5)
Native Hawaiian			2 (0.1)
Latinx			19 (1.4)
Other			4 (0.3)
Highest Level of Education			
No Diploma/No GED			69 (5)
High school Diploma/ GED			404 (28.8)
Some college, no degree			324 (23.1)
Associate’s Degree/Vocational/2 yr			115 (8.2)
Graduated college (4-5 yrs)			268 (19.1)
Some graduate school			40 (2.8)
Master’s Degree			146 (10.4)
Doctoral Degree			36 (2.6)
Employment Status – Employed			770 (54.8)
Religious (Yes/No) – Religious			1055 (75.1)
Number of Children (total)	2.61 (0-11)	1.60	
Sexual Orientation			
Heterosexual			1150(81.9)
Homosexual			12 (0.9)
Bisexual			10 (0.7)
Cohabitation Length (in years)	25.49 (.02-54.00)	13.42	
Married to current partner			1323 (94.2)

Table 3

Sample Demographics (continued)

Characteristic	*M* (range)	*SD*	N (%)
Sexual Frequency			
Never/Not at all			184 (13.1)
Less often than once a month			139 (9.9)
Once a month			107 (7.6)
Two or three times a month			230 (16.4)
Once a week			282 (20.1)
Two or more times a week			216 (15.4)

N= 1,405 (Age only variable reflecting imputed data)

Covariates

Relationships between sexual satisfaction and the demographic variables of survey date, race, employment status, number of children, sexual orientation, marriage status, and sex frequency were analyzed to search for potential confounding variables.

Only one variable, sexual frequency, appeared to be strongly associated with sexual satisfaction ($r = .634$, $p < .001$). Given the high correlation between sex frequency and sexual satisfaction, secondary analyses focused on better exploring this relationship and implications for this relationship in the hypothesized models. Secondary analyses controlled for sex frequency and also examined this variable as a dependent variable for the hypothesized models of sexual satisfaction. This approach was used, rather than merely controlling for sex frequency in primary analyses, given the nature of sex frequency and its varied and complicated ties to sexual satisfaction in the literature (Bridges et al., 2004; Forbes et al., 2017; Impett et al., 2014). Additionally, the wording of this item in the survey creates difficulties in its interpretation, and was therefore

avoided in primary analyses as a controlled variable. This question was worded as "Over the past six months, how often have you had sex with someone?" Individuals interpret "sex" in many different ways based on varied culture and context, and likely answered this question with different ascribed meanings.

Main Analyses

Hypothesis 1. An ecological model - including the macrosystem level variable of religiosity, the exosystem level variables of SES, social support, and parenthood, the mesosystem level variables of relationship satisfaction, affectual solidarity, relationship length, and sexual functioning, and the microsystem level variables of age, negative affect, and physical health and functioning - together significantly predict sexual satisfaction in a national sample of women in midlife

This hypothesis was tested using regression analyses with a split sample. The sample was split according to even or odd numbered participant identification numbers. The split sample was used to reduce potential Type 1 errors, and a regression analysis was chosen due to its ability to determine the strength of this proposed model and to identify which variables were significant. As discussed previously, SES included the specific variables of income and highest education, relationship satisfaction was removed from the analyses, and parenthood was represented by the variable of adult children in the home.

Within the odd sample, the final model was significant in the original sample, $F(11,424) = 18.140$ $p < .001$, $R^2 = .320$, Adjusted $R^2 = .302$. The pooled data were used to identify significant variables in this model. As such, unstandardized betas and standard errors for unstandardized betas were used, as analyses did not compute standardized betas

for pooled analyses. Income (*B*= -.002, *SE B*= .001, *p*< .05), affectual solidarity (*B*= 2.195, *SE B*= .197, *p*< .001), sexual function (*B*= 1.201, *SE B*= .229, *p*< .001), age (*B*= -.049, *SE B*= .014, *p*< .05), and physical health (*B*= .285, *SE B*= .109, *p*< .05) were each significant variables within the odd sample, contributing to sexual satisfaction in this sample of midlife women. Results of the regression analysis for the odd sample are presented in Table 4.

Within the even sample, the final model was also significant, $F(11, 441) = 18.413$ $p<.001$, $R^2 = .315$, Adjusted $R^2 = .298$. Again, the pooled data were used to identify significant variables within the even sample, using unstandardized betas and standard errors. Within this sample, religious identification (*B*= .001, *SE B*= .000, *p*< .05), income (*B*= -.002, *SE B*= .001, *p*< .05), affectual solidarity (*B*= 1.920, *SE B*= .181, *p*< .001), sexual function (*B*= 1.341, *SE B*= .190, *p*< .001), and negative affect (*B*= -1.995, *SE B*= .781, *p*< .05) were significant variables contributing to sexual satisfaction. Results of the regression analysis for the even sample are presented in Table 5.

In sum, both odd and even samples yielded significant final models, suggesting support for an ecological approach to examining sexual satisfaction in midlife women. The specific variables that were significant in both odd and even samples were income, affectual solidarity, and sexual function. Therefore, further analyses controlled for these three variables to explore the impact of caregiving on sexual satisfaction. Variables that were significant in one sample, but not the other, included religious identification, age, physical health and functioning, and negative affect. Of note, religious identification, although not significant in the odd analyses, was approaching significance in the odd sample (*B*= .001, *SE B*= .000, *p*= 068). Between the two odd and even samples, variables

from every level of the ecological model were found to be significant in predicting sexual satisfaction in this population.

Table 4

Summary of Regression Analysis for Sexual Satisfaction in Odd Sample (N=697)

Model and Predictor Variables	*B*	*SE B*	*t*	*R*	R^2 / Adjusted R^2	*F*
Odd Model				.57	.32 / .30	18.14**
Religious Identification	.00	.00	-1.84			
Income	-.00*	.00	-2.70			
Education	-.01	.043	-.24			
Social Support	-.04	.17	-.23			
Adults in the Home	-.08	.23	-.33			
Affectual Solidarity	2.20**	.20	11.13			
Relationship Length	.00	.01	.36			
Sexual Function	1.20**	.23	5.24			
Age	-.05*	.01	-3.45			
Negative Affect	-.17	.78	-.21			
Physical Health and Functioning	.29*	.11	2.62			

**p < .05. **p< .001*

Table 5

Summary of Regression Analysis for Sexual Satisfaction in Even Sample (N=708)

Model and Predictor Variables	*B*	*SE B*	*t*	*R*	R^2 / *Adjusted* R^2	*F*
Even Model				.56	.32 / .30	18.41**
Religious Identification	.00*	.000	2.34			
Income	-.00*	.001	-2.06			
Education	.01	.04	.17			
Social Support	.04	.15	.25			
Adults in the Home	.10	.23	.43			
Affectual Solidarity	1.92**	.18	10.61			
Relationship Length	-.01	.01	-.62			
Sexual Function	1.34**	.19	7.07			
Age	-.02	.01	-1.63			
Negative Affect	-2.00*	.78	-2.55			
Physical Health and Functioning	.06	.11	.50			

**p < .05. **p< .001*

Hypothesis 2

Hypotheses 2a and 2b were tested with hierarchical regression analyses to control for the impact of income, affectual solidarity, and sexual function and investigate the impact on family caregiving status on sexual satisfaction. Both hypotheses utilized the full dataset, rather than spit samples, due to the smaller number of participants who identified themselves as caregivers.

Hypothesis 2a. Having been a family caregiver within the past 12 months adds to the predictive power of the existing ecological model on sexual satisfaction, with caregiving associated with decreased satisfaction. Block 1 of this regression

included income, affectual, and sexual function, as described above. This first block resulted in a significant model with a large effect size, $F(3, 968) = 139.605$ $p<.001$, $R^2 = .302$, Adjusted $R^2 = .300$. Caregiver status was added to the second block of this regression. A hierarchical regression revealed that the final model including caregiver status was significant, $F(4, 967) = 104.678$, $p<.001$. However, contrary to hypothesis, family caregiving status did not account for more variance in sexual satisfaction than the ecological model variables of income, affectual solidarity, and sexual function, $\Delta R^2 = .000$, $p = .633$. Results are presented in Table 6.

Hypothesis 2b. Intergenerational family caregiving specifically adds to the predictive power of the existing model, associated with decreased satisfaction. The same procedure as described for hypothesis 2a was conducted for hypothesis 2b with intergenerational caregiver status entered in the second block, rather than the more general variable of family caregiver status. In the first block, income, affectual solidarity, and sexual function resulted in a significant model, $F(3, 139) = 23.274$, $p<.001$, $R^2 = .334$, Adjusted $R^2 = .320$. Intergenerational caregiving status was added into the second block of this regression, and the model remained significant, $F(4, 138) = 17.572$, $p<.001$, $R^2 = .337$, Adjusted $R^2 = .318$. However, contrary to hypothesis, intergenerational caregiver status did not account for more variance in sexual satisfaction than the ecological model variables of income, affectual solidarity, and sexual function, $\Delta R^2 = .003$, $p = .424$. Results are presented in Table 7.

Hypotheses within research aim 3 were not tested, due to the lack of support for hypothesis 2 and the lack of relationship between caregiving status and sexual satisfaction.

Table 6

Summary of Hierarchical Regression Analysis for Family Caregiving Status and Sexual Satisfaction (N=1,405)

Step and Predictor Variables	*B*	*SE B*	*R*	R^2 / Adjusted R^2	$\Delta R2$	*F*	ΔF
Step 1			.55	.30 / .30		139.61**	
Income	-.00*	.00					
Affectual Solidarity	2.04**	.13					
Sexual Function	1.40**	.16					
Step 2			.55	.30/.30	.00	104.68**	.228
Income	-.00*	.00					
Affectual Solidarity	2.03**	.13					
Sexual Function	1.41**	.16					
Family Caregiving Status	-.19	.20					

**p < .05. **p< .001*

Table 7

Summary of Hierarchical Regression Analysis for Intergenerational Caregiving Status and Sexual Satisfaction (N=218)

Step and Predictor Variables	*B*	*SE B*	*R*	R^2 / *Adjusted* R^2	*ΔR2*	*F*	*ΔF*
Step 1			.58	.33 / .32		23.27**	
Income	-.00	.00					
Affectual Solidarity	2.23**	.35					
Sexual Function	1.19*	.48					
Step 2			.58	.34/.32	.00	17.57**	.643
Income	-.00	.00					
Affectual Solidarity	2.21**	.35					
Sexual Function	1.20*	.45					
Int. Caregiving Status	.24	.36					

**p < .05. **p< .001*

Secondary Analyses

Secondary analyses were conducted to better explore relationships between variables due to findings from both preliminary and primary analyses.

Controlling for Sex Frequency

Given the high correlation between sex frequency and sexual satisfaction (r = .634, p <.001), secondary analyses examined the hypothesized ecological model for sexual satisfaction, while controlling for sex frequency. Sex frequency had a significant portion of missing data (17.6%), so results should be interpreted with some caution. Sex frequency was not imputed due to it not being a hypothesized variable in the main analyses. As explained in the analyses for the first hypothesis, the sample was split according to even or odd numbered participant identification numbers in order to reduce

potential Type 1 errors. A hierarchical regression model was used, with the first block of the regression containing the variable of sex frequency, and the second block including the proposed ecological variables of religious identification, income, education, social support, adult children in the home, affectual solidarity, relationship length, sexual functioning, age, negative affect, and physical health and functioning. All variables were included in these analyses in order to identify any potential changes in this model with the addition of sexual frequency.

In the odd sample, the first block resulted in a significant model with a large effect size, $F(1,432) = 243.791$, $p<.001$, $R^2 = .361$, Adjusted $R^2 = .359$. The ecological model variables were added to the second block of the regression, and a hierarchical regression revealed that this final model was significant, $F(11,421) = 43.136$ $p<.001$, $R^2 = .551$, Adjusted $R^2 = .539$. The addition of ecological model variables resulted in a significant increase in the variance accounted for in sexual satisfaction while controlling for sexual frequency, $\Delta R^2 = .191$, $p<.001$. Specifically, pooled analyses revealed that in the final model, sexual frequency ($B = .854$, $SE\ B = .049$, $p < .001$), income ($B = -.002$, $SE\ B = .001$, $p < .05$), affectual solidarity ($B = 1.588$, $SE\ B = .186$, $p < .001$), and sexual function ($B = .904$, $SE\ B = .216$, $p < .001$) were all significant in predicting sexual satisfaction. In comparison to analyses that did not control for sexual frequency (hypothesis 1), both age ($B = -.008$, $SE\ B = .013$, $p = .533$) and physical health and functioning ($B = .101$, $SE\ B = .093$, $p = .277$) were no longer significant variables in this sample when sexual frequency was controlled for. Results of the regression analyses for the odd sample are presented in Table 8.

In the even sample, the first block resulted in a significant model, as well, $F(1,449) = 221.421$, $p < .001$, $R^2 = .330$, Adjusted $R^2 = .329$. As described above, the proposed ecological model variables were added into the second block, and a hierarchical regression analysis revealed that this final model was also significant, $F(11,438) = 48.201$, $p < .001$, $R^2 = .569$, Adjusted $R^2 = .557$. Again, the addition of the ecological model variables resulted in a significant increase in variance accounted for in sexual satisfaction, $\Delta R^2 = .239$, $p < .001$. Pooled analyses revealed that in the final model, sex frequency (*B*= .924, *SE B*= .051, $p < .001$), income (*B*= -.002, *SE B*= .001, $p < .05$), affectual solidarity (*B*= 1.368, *SE B*= .149, $p < .001$), sexual function (*B*= .954, *SE B*= .153, $p < .001$), negative affect (*B*= -1.596, *SE B*= .664, $p < .05$), and age (*B*= .039, *SE B*= .012, $p < .05$) were all significant predictors of sexual satisfaction. In comparison to analyses that did not control for sexual frequency in the even sample, religious identification was no longer significant (*B*= .000, *SE B*= .000, $p = .561$), and age became significant only when controlling for sex frequency (*B*= .04, *SE B*= .012, $p < .05$). Results of this regression analysis are presented in Table 9.

Table 8

Summary of Hierarchical Regression Analysis for Sexual Satisfaction in Odd Sample (N=571)

Step and Predictor Variables	*B*	*SE B*	*R*	R^2 / *Adjusted* R^2	*ΔR2*	*F*	*ΔF*
Step 1			.60	.36 / .36		243.79**	
Sex Frequency	1.01**	.05					
Step 2			.74	.55/.54	.19**	43.14	16.28
Sex Frequency	.85**	.05					
Religious Identification	.00	.00					
Income	-.00*	.00					
Education	-.01	.04					
Social Support	.09	.14					
Adults in the Home	-.03	.19					
Affectual Solidarity	1.59**	.19					
Relationship Length	.01	.01					
Sexual Function	.90**	.22					
Age	-.01	.01					
Negative Affect	-.66	.67					
Physical Health and Functioning	.10	.09					

**p < .05. **p< .001*

Table 9

Summary of Hierarchical Regression Analysis for Sexual Satisfaction in Even Sample (N=587)

Step and Predictor Variables	*B*	*SE B*	*R*	*R2 / Adjusted R2*	*ΔR2*	*F*	*ΔF*
Step 1			.58	.33 / .33		221.42**	
Sex Frequency	1.07**	.06					
Step 2			.75	.57/.56	.24**	48.20**	22.07
Sex Frequency	.92**	.05					
Religious Identification	.00	.00					
Income	-.00*	.00					
Education	.00	.04					
Social Support	.04	.13					
Adults in the Home	.09	.20					
Affectual Solidarity	1.37**	.15					
Relationship Length	-.00	.01					
Sexual Function	.95**	.15					
Age	.04*	.01					
Negative Affect	-1.60*	.66					
Physical Health and Functioning	.08	.09					

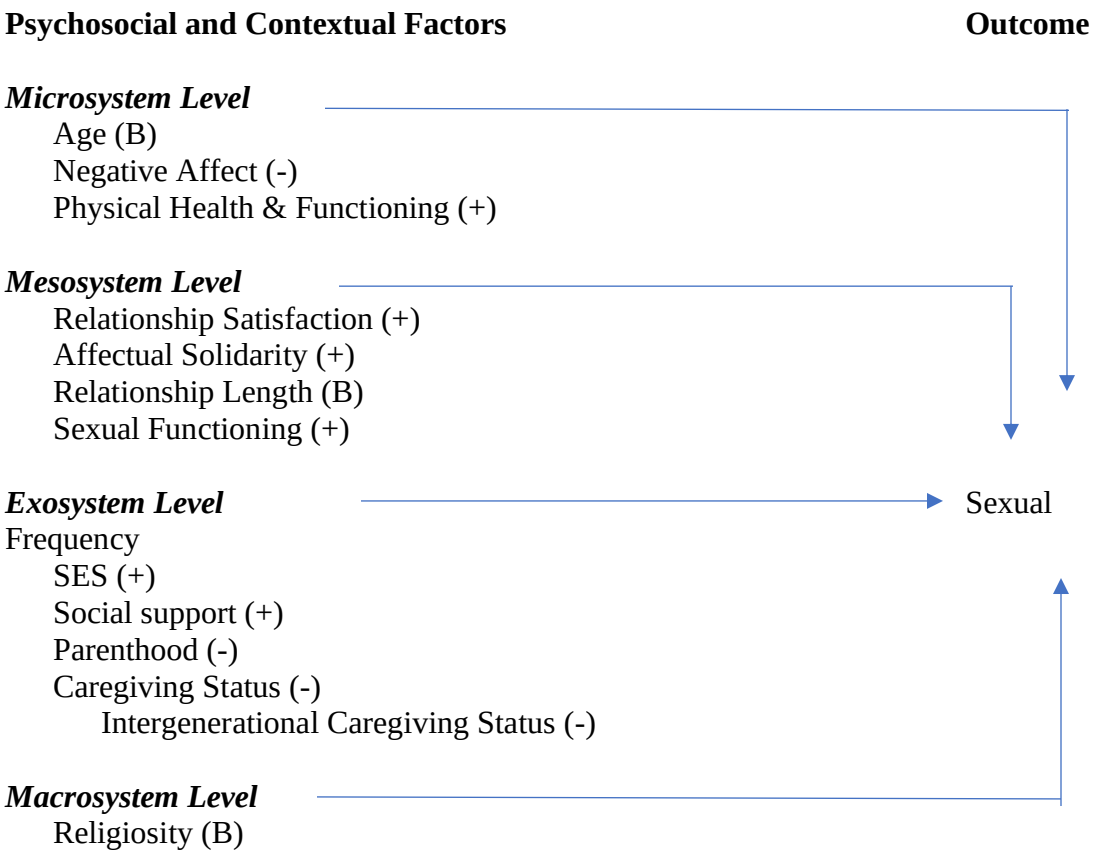
**p < .05. **p< .001*

In sum, both odd and even samples yielded significant final models and significant increases in the variance accounted for with the addition of ecological level variables. The three significant variables found across both samples in the main analyses (income, affectual solidarity, and sexual frequency) remained significant, even when controlling for sexual frequency. Differences between these analyses and main analyses

that did not control for sex frequency were most notable with regard to age. In main analyses, age was significant in the odd sample (*B*= -.049, *SE B*= .014, *p*<.05), and not in the even sample. When controlling for sex frequency, however, age was no longer significant in the odd sample, but became significant in the even sample (*B*= .039, *SE B*= .012, *p*<.05). Other differences included that physical health and functioning and religious identification were no longer significant.

Sex Frequency as a Dependent Variable

The hypothesized ecological model was also examined to predict sex frequency as a dependent variable, rather than sexual satisfaction. The split sample was utilized as described in the main analyses, and regression analyses were used to determine the strength of the proposed model in predicting sex frequency. Figure 3 offers a representation of the proposed model.



B = Either direction. Caregiving status, and specifically being an intergenerational caregiver, will be tested as a potential predictor

Figure 3. Ecological Model of Sexual Frequency for Studying Midlife Women in Relationships

Within the odd sample, the final model was significant in the original data, $F(11,422)= 4.988$, $p<.001$, $R_2= .115$, Adjusted $R_2 = .092$. The pooled data were used to identify significant variables in the model. Affectual solidarity ($B= .809$, $SE\ B= .150$, $p< .001$), sexual function ($B= .293$, $SE\ B= .146$, $p< .05$), age ($B= -.050$, $SE\ B= .0111$, $p< .001$), and physical health ($B= .208$, $SE\ B= .077$, $p< .05$) were each significant variables in the odd sample, predicting sexual frequency in midlife women. Results are presented in Table 10.

Within the even sample, the final model was also significant, $F(11,444) = 4.752$, $p < .001$, $R^2 = .105$, Adjusted $R^2 = .083$. Pooled data were again used to identify significant variables. Religious identification ($B = .001$, $SE\ B = .000$, $p < .05$), affectual solidarity ($B = .561$, $SE\ B = .124$, $p < .001$), sexual function ($B = .486$, $SE\ B = .126$, $p < .001$), and age ($B = .-.065$, $SE\ B = .010$, $p < .001$) were each significant variables predicting sexual frequency. Results of these analyses are presented in Table 11.

The specific variables that were significant in both odd and even samples were affectual solidarity, sexual function, and age. In comparison to predicting sexual satisfaction, both affectual solidarity and sexual function were significant variables in both models. Income was significant in predicting sexual satisfaction, whereas it was not in predicting sexual frequency. Age was significant in predicting sex frequency, whereas its relationship with sexual satisfaction appeared to be more complicated.

Table 10

Summary of Regression Analysis for Sexual Frequency in Odd Sample (N=697)

Model and Predictor Variables	*B*	*SE B*	*t*	*R*	R^2 / *Adjusted* R^2	*F*
Odd Model				.34	.12 / .09	4.99**
Religious Identification	.00	.00	1.72			
Income	.00	.00	-.04			
Education	-.01	.03	-.31			
Social Support	-.17	.11	-1.45			
Adults in the Home	-.15	.17	-.86			
Affectual Solidarity	.81**	.15	5.39			
Relationship Length	-.01	.01	-1.54			
Sexual Function	.29*	.15	2.01			
Age	-.05**	.01	-4.64			
Negative Affect	.40	.56	.72			
Physical Health and Functioning	.21*	.08	2.69			

**p < .05. **p< .001*

Table 11

Summary of Regression Analysis for Sexual Frequency in Even Sample (N=587)

Model and Predictor Variables	*B*	*SE B*	*t*	*R*	R^2 / Adjusted R^2	*F*
Odd Model				.33	.11 / .08	4.75**
Religious Identification	.00**	.00	3.38			
Income	.00	.00	-.40			
Education	.01	.03	.21			
Social Support	-.01	.11	-.08			
Adults in the Home	.07	.17	.44			
Affectual Solidarity	.56**	.12	4.54			
Relationship Length	-.00	.01	-.71			
Sexual Function	.49**	.13	3.86			
Age	-.07**	.01	-6.27			
Negative Affect	-.51	.54	-.95			
Physical Health and Functioning	-.02	.07	-.21			

**p < .05. **p< .001*

Effects of Caregiving Status on Sex Frequency

Hypotheses 2a and 2b investigated the impact of family caregiving on sexual satisfaction. Secondary analyses similarly examined the impact of family caregiving on sexual frequency, in place of sexual satisfaction. Hierarchical linear regression was used to control for the effects of affectual solidarity, sexual function, and age, given their significant contribution to sexual frequency as explained above. The full dataset was used due to the smaller number of participants who identified themselves as caregivers.

First, a hierarchical regression was used to evaluate the impact of general family caregiving. Block 1 of this regression included affectual solidarity, sexual function, and age. This first block resulted in a significant model, $F(3, 1018) = 34.867$, $p < .001$, $R^2 = .093$, Adjusted $R^2 = .091$. Caregiver status was added to the second block of this regression. A hierarchical regression revealed that the final model including caregiver status was significant, $F(1, 1017) = 26.529$, $p < .001$, $R^2 = .094$, Adjusted $R^2 = .091$. However, family caregiving status did not account for more variance in sexual frequency than the ecological model variables of income, affectual solidarity, and sexual function, $\Delta R^2 = .001$, $p = .226$. Results of this hierarchical linear regression are presented in Table 12.

Table 12

Summary of Hierarchical Regression Analysis for Family Caregiving Status and Sexual Frequency (N=1,158)

Step and Predictor Variables	*B*	*SE B*	*R*	*R2 / Adjusted R2*	*ΔR2*	*F*	*ΔF*
Step 1			.31	.09 / .09		34.87**	
Affectual Solidarity	.66**	.09					
Sexual Function	.42**	.10					
Age	-.06**	.01					
Step 2			.31	.09/.09	.00	26.529**	1.47
Affectual Solidarity	.66**	.09					
Sexual Function	.42**	.10					
Age	-.06**	.01					
Family Caregiving Status	-.00	.13					

**p < .05. **p< .001*

A similar hierarchical linear regression was used again, replacing family caregiving status with the more specific variable of intergenerational caregiver status. The first block containing affectual solidarity, sexual function, and age resulted in a significant model, $F(3, 146) = 5.57$, $p = .001$, $R^2 = .102$, Adjusted $R^2 = .084$ (R=.320). Intergenerational caregiver status was then added into the second block of the regression, and a hierarchical regression revealed that the final model including intergenerational caregiver status was significant, $F(1, 145) = 5.639$, $p < .001$, $R^2 = .135$, Adjusted $R^2 = .111$ (R=.367). The addition of intergenerational caregiver status resulted in an increase in variance accounted for in the model, $\Delta R^2 = .032$, $p < .05$. This result was only evident in the original data that reflects listwise deletion for missing data in affectual solidarity and sexual function, and not in any of the five imputations of data. Pooled analyses revealed that intergenerational status was not a significant variable contributing to sexual frequency; original data contrasted with this, with intergenerational status predicting sexual frequency, ß = -.186, $p < .05$. Results can be seen in Table 13.

Table 13

Summary of Hierarchical Regression Analysis for Intergenerational Caregiving Status and Sexual Frequency (N= 181)

Step and Predictor Variables	*B*	*SE B*	*R*	R_2 / *Adjusted* R_2	*ΔR2*	*F*	*ΔF*
Step 1			.37	.14 / .11		5.56**	
Affectual Solidarity	.73*	.24					
Sexual Function	.47	.27					
Age	-.07**	.02					
Step 2			.37	.14/.11	.03*	5.64**	5.39*
Affectual Solidarity	.75*	.24					
Sexual Function	.46	.27					
Age	-.07**	.02					
Int. Caregiving Status	-.13	.26					

**p < .05. **p< .001*

Discussion

The present study examined an ecological model to hypothesize predictors of sexual satisfaction in midlife women in relationships. This study also focused on the role of intergenerational caregiving in predicting sexual satisfaction in this population, and hypothesized potential mechanisms for this proposed relationship. Interpretation of results will be discussed, as well as strengths and limitations of the study. Clinical implications and suggestions for future research will be highlighted, as well.

Interpretation of Results

An ecological model of sexual satisfaction

Support was partially found for the first hypothesis, which predicted that an ecological model - including the macrosystem level variable of religiosity, the exosystem level variables of SES, social support, and parenthood, the mesosystem level variables of relationship satisfaction, affectual solidarity, relationship length, and sexual functioning, and the microsystem level variables of age, negative affect, and physical health and functioning - would together significantly predict sexual satisfaction in a national sample of women in midlife. This hypothesis was based on research underscoring the importance of a variety of factors, beyond mere sexual frequency, in understanding sexual satisfaction in women (Bridges et al., 2004; Henderson et al., 2009; Impett et al., 2004). In sum, the predicted model was significant across both odd and even samples, suggesting the usefulness of this framework in predicting sexual satisfaction: Odd sample, $F(11,424) = 18.140$ $p < .001$, $R^2 = .320$, Adjusted $R^2 = .302$; Even sample, $F(11, 441) = 18.413$ $p < .001$, $R^2 = .315$, Adjusted $R^2 = .298$.

Across both odd and even samples, this study found that income, affectual solidarity, and sexual function all significantly predicted sexual satisfaction. These variables spread across the exosystem and mesosystem levels of an ecological framework. These findings are consistent with research underscoring the importance of relationship factors and sexual function in women's sexual satisfaction. Relationship satisfaction is one of the most studied factors in women's sexual satisfaction and has been shown to be highly related with sexual satisfaction across a range of female samples (Byers, 2005; Byers & Rehman, 2014; Impett et al., 2014; Lawrance & Byers, 1995;

Sprecher, 2002). This study expanded on the previous research by studying relationship satisfaction in midlife women specifically, and within the context of other ecological variables. Sexual function as a predictor of satisfaction is also supported by the previous research, and may carry significant weight for middle-aged women, given that sexual dysfunction is most common in midlife (Thomas & Thurston, 2016).

Income as a predictor of sexual satisfaction is also supported by previous findings, although there is less research on this variable than on relationship factors. This study provides support for income predicting sexual satisfaction in middle-aged women, specifically, extending the research on SES factors. Research highlights possible reasons why income may be tied to sexual satisfaction, including its effects on stress, wellbeing, affect, and relationships (Henderson et al., 2009; Sánchez-Fuentes et al., 2014).

When considering both odd and even samples, variables from every ecological level predicted sexual satisfaction, including religious identification, physical health, negative affect, and age in addition to the predictors described above. Although these variables are less certain predictors of sexual satisfaction, given that they were significant in one sample but not the other, they are worth drawing attention to.

Religious identification predicted sexual satisfaction in the even sample only, B= .001, $SE\ B$= .000, p< .05. Previous research shows varying effects of religiosity on sexual satisfaction, including decreased satisfaction or no effects at all (Davidson et al., 1995; Higgins et al., 2010; Sánchez-Fuentes et al., 2014). This study utilized religious identification to define religiosity, which captures the importance of religion to individuals. Based on this study's findings, religious identification is not a clear predictor of sexual satisfaction in middle-aged women. It is possible that other measures of religion

are more important in this population, such as religious upbringing, specific practices, or specific religious schemas (e.g., fundamentalism).

In this study, physical health and functioning was found to be a significant predictor of sexual satisfaction in the odd sample, but not the even sample (*B*= .285, *SE B*= .109, *p*< .05). This lack of clear support for physical health and functioning is in contradiction to research showing that for middle-aged women, physical activity is correlated with sexual enjoyment (Hess et al., 2009). It is possible that the specific item used in this study did not capture aspects of physical health and function that may be most relevant to sexual satisfaction, such as exercise frequency or body image, given that physical health was measured by one single item (Byers, 2006; Penhollow & Young, 2008).

Negative affect was found to contribute to sexual satisfaction in the even sample, *B*= -1.995, *SE B*= .781, *p*< .05, but not in the odd sample. This uncertain relationship is consistent with research indicating that negative affect may decrease in importance as other factors are taken into account, such as sexual functioning and relationship satisfaction (Henderson et al., 2009).

Finally, age was significant in the odd sample only, *B*= -.049, *SE B*= .014, *p*< .05. This finding reflects the varied research regarding age and sexual satisfaction, and the potential that age likely contributes to sexual satisfaction due to its effects on other factors, such as sexual frequency or relationship satisfaction. Age is discussed further in this discussion, as secondary analyses are explored.

Many of these uncertain variables represent constructs within a microsystem level. It is possible that these variables differ in their meaning in light of other levels of

an ecological framework. For example, negative affect might significantly contribute to sexual satisfaction, but this may only be meaningful in the context of lower relationship satisfaction.

There were also predictors that did not contribute to sexual satisfaction in either sample, contrary to hypothesis, including parenthood, social support, education, and relationship length. The lack of support for parenthood was likely due to measurement difficulties, given that this study was only able to evaluate the presence of adult children in the home, rather than children of all ages. Given previous research findings, it is likely that having non-adult children in the home negatively contributes to sexual satisfaction (Ahlborg et al., 2005; Leavitt et al., 2017). Perhaps the presence of adult children in the home is less demanding and less stressful than having younger children in the home. Of note, social support was significantly correlated with sexual satisfaction (r = .15, p <.001), but did not remain a significant predictor of sexual satisfaction when taking other ecological variables into account. Previous research showing effects of social support on satisfaction did not take relationship satisfaction into account (Hess et al., 2009); it is possible that in this study, social support may have been an indication of overall relationship quality with others, and that relationship satisfaction itself was a much more important predictor of sexual satisfaction.

With regard to education, it is possible that income plays a much larger role in satisfaction as an SES variable due to its effects on stress, relationships, and wellbeing. Additionally, this sample did not include many individuals without a diploma or GED, and it is possible that results may have looked different in a more educationally diverse group. Within this study's sample, the mean length of relationship was 25 years. The

inclusion criteria for this study required participants to be married or in marriage-like relationships, which likely led to participants with longer relationship lengths than shorter ones. It is possible that different inclusion criteria may have yielded different results. Additionally, this study utilized cohabitation length to measure relationship length given the variables available, but previous research has generally focused on relationship length. The research on relationship length is varied, and it is possible that other factors related to relationship length, such as affectual solidarity and sexual frequency, are more important in considering sexual satisfaction.

Caregiving status and sexual satisfaction

After accounting for significant predictors of sexual satisfaction, caregiving status, as well as intergenerational caregiving status specifically, did not significantly predict sexual satisfaction as hypothesized. This hypothesis was based on research revealing the detrimental effects of other forms of caregiving on sexual satisfaction, and the speculation that the stress, burden, and relationship effects that can accompany a caregiving role would predict decreased satisfaction in this population. This study's findings suggest that informal caregiving does not have a significant impact on sexual satisfaction in this population. One possible explanation for this finding is that the nature of sexual satisfaction and its predictors may shift once someone is a caregiver, such that the level of satisfaction remains as expectations change over time. For example, research has found that physical closeness behaviors, such has hand holding and hugging, more strongly predict sexual satisfaction in intergenerational caregivers than sexual behaviors (Arenella & Steffen, 2017). Research also underscores how expectations regarding sex change with age, and it is possible that taking on the caregiving role leads to differing

expectations that protect against deleterious effects on sexual satisfaction (Huang et al., 2009; Thomas et al., 2015). One surprising finding was that in the model looking only at caregivers, income was not a significant predictor of sexual satisfaction. This difference in predictors may be evidence that predictors of sexual satisfaction can change for this group of women.

It is also possible that the item used in this study to identify caregivers was not sufficient. This item asked participants if they had given personal care to someone in the past 12 months and to whom they had given care most. Given research underscoring how psychological effects of caregiving differ across time, it is possible that that findings may have been different if length of caregiving was used, instead; research suggests that for women caring for a partner with dementia, mild to moderate dementia caregivers report greater dissatisfaction, and this may be due to the recency of transitions experienced (Dourado et al., 2010). Additionally, caregiver status is likely impacted by SES and an individual's ability to afford caregiving services. It is possible that a different indication of caregiving, such as length of time or percentage of care provided, might be more relevant and less influenced by confounding variables.

This study included further hypotheses regarding the nature of the proposed relationship between caregiving and sexual satisfaction, however, these analyses were not completed due to the lack of evidence for this relationship in the data.

Controlling for Sexual Frequency

Secondary analyses were completed to further explore the role of sexual frequency, given its high correlation with sexual satisfaction (r = .634, p <.001). First, analyses found that when controlling for sex frequency, the addition of ecological

variables resulted in an increase in variance accounted for in sexual satisfaction in both odd and even samples. The three significant variables found across both samples from the first hypothesis remained as the three significant variables when controlling for sex frequency. This finding highlights the robustness of income, affectual solidarity, and sexual functioning in contributing to middle age women's sexual satisfaction. Findings highlight that sexual frequency is an important piece of understanding sexual satisfaction in this population, but that ecological level variables remain critical in this process.

The variable of age was affected by the addition of sex frequency. In the odd sample, age significantly predicted decreased satisfaction (B= -.049, $SE\ B$= .014, p<.05), but was no longer significant when controlling for sex frequency. In the even sample, age was not a significant predictor of sexual satisfaction, but became significant in a positive direction when controlling for sex frequency (B= .039 $SE\ B$= .012, p<.05). In general, data reveal that the relationship between age and sexual satisfaction appears vulnerable to the influence of other variables, especially sex frequency. Although beta weights were not large for these findings, it appears that when frequency remains equal, there is slight evidence that older age predicts higher satisfaction. Age's minimal effects on lower sexual satisfaction in the first hypothesis may be due to decreases in sexual frequency, and there is a possibility that older age leads to heightened satisfaction due to aspects like sexual wisdom or changes in expectations (Forbes et al., 2017). It is also possible that age is a proxy for other related constructs, such as health and sexual functioning.

Sex Frequency as a Dependent Variable

Secondary analyses also examined the proposed ecological model in predicting sexual frequency, as opposed to sexual satisfaction. In sum, the variables that were significant in both odd and even samples were affectual solidarity, sexual function, and age. Results suggest that affectual solidarity and sexual function are critical components of understanding both satisfaction and frequency in this population of women. This makes sense given that greater relationship strength and greater sexual function likely lead to a higher frequency of sexual behavior. Results also suggest that whereas income is more of a factor in considering satisfaction versus frequency, age is more clearly tied to sexual frequency than satisfaction.

Finally, secondary analyses examined effects of caregiving status on sexual frequency. Whereas personal caregiving in general did not predict sexual frequency when controlling for the effects of affectual solidarity, sexual function, and age, intergenerational caregiving did result in an increase in variance accounted for in sexual frequency in original data only ($\Delta R^2 = .032$, $p < .05$). This finding suggests that intergenerational caregiving may lead to decreased sexual frequency in middle-aged women. This is consistent with research suggesting that caregiving roles, in general, are associated with increased burden and stress and a resulting tendency to deprioritize sexual intimacy (Dourado et al., 2010; Dow & Malta, 2017). Results were only significant in original data, and not in imputed versions of the data. This implies that there is something about the sample of intergenerational caregivers who did *not* respond to questions about affectual solidarity and sexual function that is different with regard to how caregiving may affect their sexual frequency. Yet, when these differences are

smoothed out with the pooled sample and imputed data, this caregiving variable loses its predictive power. Table 1 includes missing data contrasting for the total sample and intergenerational caregivers to provide more information on these caregivers and the nature of their missing data. A possible interpretation of these results is that intergenerational caregivers who did report data on their affectual solidarity and sexual function are the same caregivers who have noticed resulting declines in sexual frequency, and are therefore, perhaps more aware of the relevance and importance of these survey questions (and subsequently more willing to answer them). This finding is inconsistent and conclusions from these results cannot be clearly made, however, it points to the need to further understand caregiving and its role in sexual frequency.

Strengths and Limitations

This study contains specific strengths and limitations that can guide further understanding of these results. Strengths of the current study include its addition to the literature by applying an ecological framework of sexual satisfaction to middle-aged women, specifically, and in its exploration of intergenerational caregiving and its role in sexual satisfaction and frequency. The integration of various theories of sexual satisfaction into a cohesive ecological framework is another major strength.

The use of MIDUS data is a particular strength of this study, as using an existing national dataset comes with many advantages. The data have been collected and analyzed by experienced researchers who are able to establish high-quality research projects (Cheng & Phillips, 2014). Additionally, such large datasets are often updated and maintained on a regular basis (Cheng & Phillips, 2014). MIDUS researchers specifically ensured quality control of the data with double data entry, programmatic cleaning

procedures, and codebooks to verify data quality (Radler, 2014). Intensive pilot research was conducted prior to MIDUS administration to ensure the validity of short-form assessments of psychosocial constructs within large population-level samples (Radler, 2014). Finally, secondary analysis of existing data increases research efficiency, due to it saving both time and financial resources, while also allowing a variety of opportunities for data pattern examination (Cheng & Phillips, 2014; Grady et al., 2013).

The present study also contains several limitations. All MIDUS participants participated in phone interviews in addition to self-administered questionnaires via mail. These methods of data collection do not ensure complete anonymity and could have resulted in some response biases, such as social desirability. For example, many participants did not answer questions on sensitive topics such as sexual satisfaction and sex frequency, and this may be due to potential concerns with anonymity. Although the use of telephone and mail circumvents some of the interpersonal contact that is associated with survey response biases, it still leaves potential room for biased responding (Tourangeau, 2004). There is also some evidence that phone interviews can create more biased responding (Holbrook et al., 2003). Additionally, the use of self-administered questionnaires can increase the likelihood that a participant does not answer sensitive topics, due to the ease of skipping questions. This may have also contributed to the large portion of missing data in this study.

Limitations of using MIDUS data also include the reduced choice of measures. Sexual satisfaction was measured with a single sexual quality of life (SQoL) item that asks the respondent to rate “the sexual aspect of their life these days” on a scale from 0 (“the worst possible situation”) to 10 (“the best possible situation”). Although this item is

grounded in a theoretical model of life quality, it would have been preferable to have a scale that utilizes a theory specific to sexual satisfaction, such as the Interpersonal Exchange Model of Sexual Satisfaction (Lawrance & Byers, 1995). As discussed previously, sexual frequency was measured with an item that asked for frequency of "sex," which creates difficulties in interpretation given the varying meanings individuals may have for the term "sex."

The study's sample also resulted in some limitations. Although the original sample size is a strength of this study, there were far fewer individuals who identified themselves as intergenerational caregivers. Although there were enough participants to confidently proceed with analyses, a larger number of caregivers would have been preferable to better understand the inconsistent relationship found between intergenerational caregiving and sexual frequency, especially given the percentage of missing data on constructs such as sexual function and affectual solidarity.

MIDUS recruitment was achieved with random digit dialing (RDD). Although this is useful in obtaining a national representative sample due to its ability to reach unlisted numbers, it also limits the sample to individuals who have a working phone. This may have left out individuals with fewer resources. Additionally, a major limitation in the current study is the lack of diversity in the sample. The current study's sample was predominantly Caucasian/White (93.2%), heterosexual (81.9%), and educated with at least a high school diploma or GED (95.0%). Results would likely look different in a more diverse sample, especially given how macrosystem-level variables such as religion and culture, and exosystem-level variables such as SES and social status have ties to sexual satisfaction throughout the literature (Sánchez-Fuentes et al., 2014). Cultural

factors are also known to influence the experience of caregiving, such as differences in family dynamics and care structure, as well as feelings of familial obligation and perceived caregiver burden (Knight & Sayegh, 2010; Yeo & Gallagher-Thompson, 2006). The homogeneous nature of the sample limits the generalizability of the current study's findings.

Study findings are also limited by some of the data issues described previously. In sum, not all statistical assumptions were met, most notably the lack of linear relationships between many of the ecological variables and sexual satisfaction. It is likely that the results underestimated the strength of these variables' relationships with sexual satisfaction. Additionally, there was evidence for slight heteroscedasticity between affectual solidarity and satisfaction, sexual function and satisfaction, and negative affect and satisfaction. The nature of these variables made it difficult to further explore these relationships with confidence in results.

Clinical Implications

Sexual satisfaction is an important component of overall wellbeing, and a better understanding of this construct can guide intervention efforts that may help individuals struggling with low satisfaction. Women tend to report decreased sexual satisfaction as they age, in addition to decreased sexual activity (Dundon & Rellini, 2010). Middle age is therefore a crucial developmental stage to target sexual satisfaction in. Results support the consideration of an ecological framework in interventions geared toward midlife women's sexual satisfaction, and a need to pay attention to contextual factors. For example, using an ecological model to guide assessment may be helpful in ascertaining relevant information with clients who come in with sexual and relational concerns.

The majority of research indicates a clear role of relationship satisfaction, and the results of this study support this relationship (Lawrance & Byers, 1995). Therefore, it is imperative that interventions addressing sexual satisfaction in midlife women directly address relationship components, including the aspects that make up affectual solidarity, such as feelings of appreciation and support (Schuster et al., 1990). Results also point to the important role of sexual function, and research indicates that sexual function of *both* partners is critical in understanding women's sexual satisfaction (Velten & Margraf, 2017). Overall, results indicate a need to focus on relationship aspects and sexual functioning of both partners.

There were inconsistent findings with regard to age, but results suggest a possibility that increased age may be associated with increased sexual satisfaction when controlling for sex frequency. Interventions can therefore use the strengths that come with age to address satisfaction concerns. A client's own "sexual wisdom" can be explored or bolstered by identifying increased knowledge, skills, and understanding of expectations (Forbes et al., 2017).

Targeting sexual satisfaction has implications for individuals' relationships and health status. Given the bidirectional relationship between relationship satisfaction and sexual satisfaction found throughout the literature, interventions geared toward sexual satisfaction may be helpful in increasing relationship factors in general (Lawrance & Byers, 1995). Additionally, although there was not a clear relationship between caregiving and sexual satisfaction, it is possible that addressing sexual satisfaction may have a protective influence on stressed caregivers and help improve their overall quality

of life, given sexual satisfaction's associations with mental and physical health (Impett et al., 2014; Sánchez-Fuentes et al., 2014).

Future Directions

Future directions for research are suggested based on the strengths and limitations inherent in this study. Future research should examine an ecological model of satisfaction, as well as the impact of caregiving, in more diverse samples. It is likely that predictors of sexual satisfaction vary among different populations, and that the impact of caregiving on sexual satisfaction is more significant across differing cultural expectations regarding the caregiver role (Sánchez-Fuentes et al., 2014; Yeo & Gallagher-Thompson, 2006). Similarly, research should aim to reach women of different sexual orientations; questions about sexual orientation can be formatted in a way to include a wide variety of responses which may help identify this aspect of diversity.

Research should also incorporate scales to measure sexual satisfaction that are grounded in theories specific to the construct itself. Examples of scales that are theory-based include the Interpersonal Exchange Model of Sexual Satisfaction (IEMSS) (Lawrance & Byers, 1995) and the New Sexual Satisfaction Scale (NSSS) (Štulhofer et al., 2010).

Future research efforts may also benefit from a more detailed examination of the relationship between age and sexual satisfaction. Research could explore whether age is itself a meaningful predictor of satisfaction, or if it is a proxy for another variable or a combination of variables, such as health, sexual functioning, or sex frequency. It will also be important to examine the role of income in sexual satisfaction. Meaningful analysis should parse out whether income predicts sexual satisfaction due to its potential stress-

buffering effects, or if income's predictive power relates more to the proportion earned by women in relationships, given the potential for SES to impact sexual satisfaction through perceptions of power and equality (Velten & Margraf, 2017).

Finally, future research would benefit from longitudinal, as well as dyadic data, approaches. Longitudinal analysis would allow a better understanding of how these predictors influence sexual satisfaction over time, and could allow for a better understanding of age within this analysis. More longitudinal designs are also needed in order to address questions of cause and mechanism of change. Dyadic designs can better assess the full, partnered experience, given the strong bidirectional relationship between relationship satisfaction and sexual satisfaction. Additionally, dyadic designs would allow an understanding of how partner characteristics might impact sexual satisfaction. For midlife women in relationships, specifically, it is important to understand how partnership dynamics might shift over time and the influence this might have on sexual satisfaction.

Summary

The first hypothesis tested an ecological model of sexual satisfaction in midlife women in relationships to examine specific predictors of satisfaction including SES, social support, parenthood, affectual solidarity, relationship length, sexual functioning, age, negative affect, and physical health and functioning. This hypothesis extended the research on sexual satisfaction by applying an ecological framework to middle-aged women, specifically. This hypothesis was partially supported and reinforces the use of an ecological framework in understanding sexual satisfaction in this population. Results

suggest the particular relevance of income, affectual solidarity, and sexual functioning in predicting sexual satisfaction in this population.

The second hypothesis predicted that having been an informal caregiver, as well as specifically an intergenerational caregiver, would add predictive power to this existing model, with caregiving associated with decreased satisfaction. This hypothesis was not supported, and results suggest that caregiving itself may not lead to changes in sexual satisfaction. Secondary analyses revealed that intergenerational caregiving may, however, lead to reduced sexual frequency.

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