

Changes in Older Adults' Sexual Behavior and Desire:
A Latent Transition Analysis

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ABSTRACT

Many older adults are sexually active, but there has been limited attention to how sexual behaviors and desires jointly change with age. We use data from the National Social Life, Health, and Aging Project (NSHAP) and latent transition analysis to determine how both partnered and unpartnered older men's and women's sexual expression shifts over time. Our sample consists of 2,245 older adults interviewed in Waves 1 and 2. We identify five latent statuses: sexually active, limited, frustrated, longing, and disinterested. Sexually active and disinterested are relatively stable statuses, with men being more likely to be classified as sexually active and women as disinterested. Most transitions reflect decreases in sexual behavior and desire over time; however, a nontrivial number of both older men and women— providing they retain desire for sex— transition to statuses characterized by more frequent sexual behavior. The findings highlight the dynamic nature of older adult's sexual expression.

Keywords: Sexual Behavior, Sexual Desire, Health Change, Latent Transition Analysis.

INTRODUCTION

Sexual activity is a key component of health and well-being, broadly defined, across the adult life course. Many studies on sexual activity and interest have focused almost exclusively on young adulthood as this is typically considered to be the most sexual active period of life (DeLamater & Sill, 2005). More recent work has challenged this focus by showing that people maintain sexual interest and activity well in later life, as more than half of older men and women are sexually active (Addis et al., 2006; Laumann et al., 2006) and think that sex is an important part of life (Fischer, 2010; Lindau et al., 2007). It is the case, however, that sexual activity and desire declines with age (e.g., Call, Sprecher, & Schwartz, 1995; Palacios- Ceña et al., 2012). Widowhood, and partner loss more generally, is a key factor for the decline in sexual interest and activity with age (Karraker, DeLamater, & Schwartz, 2011; Palacios- Ceña et al., 2012). Poor health and changes in physiology are important too for explaining reduced sexual activity with age among partnered individuals (Ambler, Bieber, & Diamond, 2012; DeLamater, 2012; Karraker et al., 2011).

Although there have been a number of recent, high-quality studies on older adults' sexual behaviors and attitudes, much remains unknown. Specifically, we lack understanding of how the various components of sexual expression—activities, motivations, and attitudes (Waite, Iveniuk, Laumann, & McClintock, 2017; Waite, Laumann, Das, & Schumm, 2009)—combine to yield distinctive profiles, how these profiles change over time, and what factors predict those changes. We address this need in the current study with longitudinal data from the National Social Life, Health, and Aging Project (NSHAP) and make two key contributions to the existing literature. First, we use Latent Transition Analysis to identify how several measures of older adults' sexual activity, desire, and motivation combine into distinct profiles and how those change over time.

Prior studies have overwhelmingly examined change in individual measures of sexual expression separately (E.g. Forbes, Eaton, & Krueger, 2017; Karraker & DeLamater, 2013; Lee, Nazroo, O'Connor, Blake, & Pendleton, 2016). Second, we include unpartnered older adults in our analysis as individuals have needs and desires independent of partnership status. This allows us to model differences in sexual expression among the unpartnered and how differences in motivations and desires lead to changes over time, including as older adults transition out of partnerships. Given that sexual activity among older adults principally occurs with long-term and overwhelmingly marital partners (Waite et al, 2009), prior work has understandably examined sexual behaviors and attitudes only among partnered samples (e.g., Orr, Layte, & O'Leary, 2017)—increasingly with dyadic data (e.g., Galinsky & Waite, 2014; Kwon & Schafer, 2017; Liu, Shen, & Hsieh, 2018). Given known differences in older adults' sexual expression and partnership status by gender (Carpenter, 2010; Fischer, 2010) we conducted our analyses separately for men and women.

BACKGROUND

Older Adults' Sexuality

Following Waite and colleagues (Waite et al., 2017; Waite et al., 2009), we conceptualize sexual expression as encompassing sexual activities, motivations, and attitudes. These are the outcome of opportunities for partnership, culturally defined beliefs, psychological processes, and physiological capacities associated with aging and disease. A number of studies indicate that older adults maintain sexual activities, express motivation for sexual intimacy, and hold attitudes favorable toward sex well into their 70s and 80s (DeLamater, 2012). More than half of older adults report having had sex in the past year (Laumann et al, 2006), with a majority reporting having sexual intercourse at least twice a month (Addis et al., 2006; Waite et al., 2009) and about

a quarter reporting sexual intercourse at least once a week (Fischer, 2010). This sexual activity usually involves vaginal intercourse and often involves oral sex (Liu et al., 2018; Waite et al., 2009). Solo masturbation is also fairly common (Addis et al., 2006; DeLamater, 2012; Herbenick et al., 2010), which is indicative of underlying desire for sexual intimacy (Waite et al., 2009). Levels of activity reflect older adults' positive sexual attitudes and motivations (Allen & Desille, 2017; DeLamater, 2012; Waite et al., 2009). For example, a nationally representative survey of adults ages 45 and over found that 58% believe that sex is critical to a good relationship and 42% agree that sex is important to quality of life (Fischer, 2010; also see Laumann et al., 2006). More positive attitudes toward sex are associated with higher levels of desire (DeLamater & Sill, 2005) and more frequent sexual activity (Graf & Patrick, 2014; Waite et al, 2017).

Among current cohorts of older adults, most sexual behavior occurs within long-term partnerships and marriage specifically (Beutel, Stöbel-Richter, & Brähler, 2008; Waite et al., 2009). Less than 5% of older adults over age 45 without a partner report having had sexual intercourse in the past six months (Fischer, 2010). Having a partner does not necessarily mean that one is engaging in sex, however, even as partnership status is positively associated with sexual desire (DeLamater & Sill, 2005). Depending on the study, approximately 30-40% of partnered older adults report no sexual activity in the past year (Beutel et al., 2008; Karraker & DeLamater, 2013).

Changes in Older Adults' Sexuality

Numerous studies show that the frequency of sexual activity and the level of sexual desire declines with age (Call et al, 1995; DeLamater & Sill, 2005; Fischer, 2010; Karraker & DeLamater, 2013; Karraker et al, 2011; Lee et al, 2016; Palacios- Ceña et al, 2012; Waite et al, 2017). This includes declines in not only sexual intercourse but also solo masturbation (Araujo,

Mohr, & McKinlay, 2004; Herbenick et al., 2010). Moreover, there is no evidence that older adults substitute one partnered activity (e.g., oral sex) for another (e.g., vaginal intercourse) to cope with declines with age (Waite et al., 2009).

Given the declining frequency of all types of sexual activity with age, it is perhaps not surprising that nearly 75% of older adults think that sexual ability decreases with age (Waite et al., 2009) and half (49%) agree that sex becomes less important with age (Fischer, 2010). Thus, when declines occur, they are likely viewed as the natural progression of life (Gott & Hinchliff, 2003), and older adults are more likely to emphasize the quality of sex rather than the quantity (Forbes et al., 2017). Although age-related hormonal changes lead to physiological changes in sexual functioning—and for some older adults an increase in sexual problems (Ambler et al., 2012; DeLamater & Karraker, 2009), declines in the frequency of sexual activity do not appear to be part of “normal aging.” Rather, the decreased frequency of sexual activity more often reflect the loss of a partner or onset of poor health (DeLamater, 2012).

Given that most sexual activity occurs within long-term partnerships (Beutel et al., 2008; Waite et al., 2009), widowhood is a primary cause of reduced sexual activity among current cohorts of older adults (Karraker et al., 2011; Palacios- Ceña et al., 2012). As sexual interest is separate from sexual behaviors, older adults continue to express interest in sex well into later life even if they do not have a partner (Waite et al., 2009). Nevertheless, over time, the absence of a partner is associated with placing reduced importance on sex (Gott & Hinchliff, 2003) and lower desire (Beutel et al., 2008; DeLamater & Sill, 2005).

Changes in physical health with age also contribute to declines in the frequency of sexual activity with age. Some physiological changes reflect normal hormonal shifts, such as a declines in testosterone that affect erection strength among men (DeLamater, 2012) and declines in

estrogen that may lead to vaginal dryness among women (Ambler et al., 2012). Changes related to disease processes and other health conditions, however, present non-normative barriers to sexual expression. Prior studies consistently show that chronic conditions are associated with less frequent intercourse and sexual inactivity (Ambler et al., 2012; DeLamater & Karraker, 2009; Kwon & Schafer, 2017; Lee et al., 2016; Palacios- Ceña et al., 2012; Syme, Klonoff, Macera, & Brodine, 2013). For example, older adults with hypertension, heart disease, or diabetes—conditions that affect the vascular system and thus the physiological capacity for sexual activity—have less frequent intercourse (Lindau et al., 2007; Træen et al., 2017). Arthritis, perhaps because of chronic pain (Syme et al, 2013), is associated with decreased sexual functioning and less frequent sexual activity (Lee et al, 2016).

Functional limitations do not appear to be associated with the frequency of sexual activity (Waite et al., 2017), although fewer studies have considered their effect. The lack of evidence, however, may be due to a substitution effect. For example, Kwon and Schafer (2017) found that among partnered older adults functional limitations were associated with a greater range of activities suggesting that older adults may adopt greater variation in response to altered abilities.

Older adults' perceptions of their health appear to be particularly consequential for sexual expression in later life. Poorer self-rated health is associated with less frequent intercourse (Lindau & Gavrilova, 2010) and oral sex (Herbenick et al, 2010), lower satisfaction with sexual functioning (Laumann et al, 2006; Syme et al, 2013) and sexual inactivity (Karraker & DeLamater, 2013; Lee et al, 2016; Syme et al, 2013). Poor self-rated health is also associated with thinking about sex less often (Lee et al., 2016) and lower interest in sex (Lindau & Gavrilova, 2010). Self-ratings that one's mental health is poor is also associated with sexual

difficulties (e.g., maintaining an erection, vaginal lubrication) (Laumann, 2008; (Karraker & DeLamater, 2013).

Older adults who rate their sexual health as poor also engage in less frequent sexual activity (Palacios-Ceña et al., 2012). The prevalence of sexual difficulties increases with age, in part as a consequence of hormonal changes and physical health conditions, but are far from universal (DeLamater & Sill, 2005; Lee et al., 2016; Træen et al., 2017). Older adults who report specific difficulties with sexual function have sex less frequently (Kwon & Schafer, 2017; Waite et al., 2017).

The Gendered Context of Older Adults' Sexuality

Sexual attitudes, interests, and activity are the outcome of individuals' lifetime experiences within the context of gendered sexual-scripts (Carpenter 2010). Especially for current cohorts of older adults, these gendered-sexual scripts are associated with large differences between (heterosexual) men and women. These gendered scripts define interest in and engagement in sexual behavior as masculine. This is perhaps why men are much more likely to express worry about the amount of sex they are having, their level of desire, and physiological performance than are women (Lee et al., 2016). By contrast, sexual expression is less core to women's identity. Moreover, women's sexuality is defined almost exclusively within marital unions (Carpenter, 2010) and less discussed. For example, older women express less comfort discussing sexual matters with a physician—even when they are married and sexually active (Adams, 2014; Lindau et al., 2007).

Indeed, numerous studies find that men report greater interest in sex and more sexual activity than do women of the same age (DeLamater, 2012; Laumann et al., 2006; Lee et al., 2016; Lindau & Gavrilova, 2010; Palacios- Ceña et al., 2012; Waite et al., 2009). For example, a

nationally representative survey of middle-aged and older adults (Fischer, 2010) found that men were more likely than women to say that they think about sex once or more every day (45% vs. 8%), that sexual activity is important to their overall quality of life (85% vs. 61%) and critical to a good relationship (67% vs. 50%). These attitudinal differences reflect men's more frequent and varied sexual activities. Older men are more likely to report having had intercourse in the past year, report more often engaging in oral sex, and more frequent masturbation (Fischer, 2010; Karraker & DeLamater, 2013). Men also report greater sexual satisfaction than women (Syme et al., 2013), which is important because prior satisfaction is linked to maintaining sexual activity among women (Thomas, Hess, & Thurston, 2015).

Differences between men and women in the frequency of sexual activity partially reflect the fact that older men are more likely to be partnered than are older women (Karraker et al., 2011; Lee et al., 2016; Lindau et al., 2007). Partnership status is unrelated to levels of sexual desire among older men, but unpartnered women express less interest in sex than do partnered women (Karraker et al., 2011; Laumann, Das, & Waite, 2008). Thus, even though most sexual activity among current cohorts of older adults occurs within marriage, older men are more apt to have had nonmarital sex in the past year (Beutel et al., 2008). Men's greater interest in sex and the greater importance they place on it for overall quality of life does not decline with age (Fischer, 2010) and as a result, the gender differences in behaviors, motivations, and attitudes widens with age (Lindau & Gavrilova, 2010).

The consequences of health changes also differ for men and women, contributing to the observed differences in sexual expression with age. Given hormonal changes, a majority of older women may experience vaginal dryness and difficulty lubricating, which may make sex less pleasurable and lead to reduced sexual frequency (Addis et al., 2006; DeLamater & Karraker,

2009; Laumann et al., 2008). Women with poor self-rated health also appear to report partnered sex as less pleasurable as less pleasurable (Laumann et al., 2008) and are less likely to masturbate (Lindau et al., 2007) than is the case among men.

Men's physical health appears unrelated to their level of sexual desire and frequency of activity (Laumann et al., 2008)—provided they can maintain an erection. However, many physical health conditions, especially those related to the vascular system, do lead to problems getting and maintaining an erection (Lee et al., 2016). This is perhaps why men's assessments of their physical and sexual health are more strongly linked to less frequent sexual intercourse, and sexual inactivity (Karraker et al., 2011; Palacios- Ceña et al., 2012) and the length of life spent sexually active (Lindau & Gavrilova, 2010). Age-related reductions in testosterone also to slower arousal, less firm erections, and a longer refractory period (DeLamater & Koepsel, 2015; DeLamater & Sill, 2005). Although about 1 in 3 older men report having had erectile problems in the past year (and this increases with age; Laumann et al., 2008; Træen et al., 2017; Waite et al., 2009), fewer (23%) have been diagnosed with erectile dysfunction and just 14% report that they are never able to get an erection firm enough for intercourse (Fischer, 2010).

The Current Study

We analyzed two waves of longitudinal data from the National Social Life, Health, and Aging Project (NSHAP) to address three research questions: (1) What are the most common patterns of sexual activity and desire among older adults? (2) How do these patterns change over time? and (3) What factors—demographic, relational, and health-related—predict these patterns and changes over time? Given that current cohort of older adults have experienced gendered-sexual scripts across their lives (Carpenter, 2010) and known sex-differences in predictors of sexual activity with age, we conducted our analyses separately for men and women.

To address these research questions we used Latent Transition Analysis (LTA; Collins & Lanza, 2010), a longitudinal extension of Latent Class Analysis (LCA) that is relatively underused to examine older adults' sexual behavior. LTA longitudinally extends the measurement model of LCA, which assumes that a set of variables (e.g., measuring different sexual behaviors) can be represented by groups who share common patterns of behaviors (Geiser, 2012). LTA models changes in latent class (called latent status; Collins & Lanza, 2010) membership over time via estimating transition probabilities. Importantly for our purposes here, LTA can estimate associations between individual characteristics and latent sexual behavior profiles and identify factors associated with transition between statuses over time.

DATA AND METHODS

Data

We used data from Waves 1 and 2 of the National Social Life, Health, and Aging Project (NSHAP; Waite et al., 2014). NSHAP is a nationally representative panel of 3,005 community-dwelling adults ages 57 to 85 in the contiguous U.S. Respondents were interviewed in 2005/2006 and again in 2010/2011. Roughly 75% of Wave 1 respondents provided a Wave 2 interview (N=2,261); 4.63% ($n=139$) were too ill to be re-interviewed, 14.31% had died ($n= 430$), and 5.82% ($n=175$) were otherwise lost to follow-up. Data on sexual behaviors and attitudes, relationship histories, and physical and mental health were collected during two-hour in-home interviews. To minimize respondent burden, NSHAP used a modularized design so that some questions were included in a Leave Behind Questionnaire (LBQ). Our final analytic sample was N=2,245, after excluding 16 respondents who reported same-sex partners as this was too few to analyze separately.

Measures

Sexual Behavior, Desire, and Motivation. We used seven measures to assess older adults' sexual expression. We selected measures that were consistently asked in both Waves given our interest in change over time. We recoded each measure based on preliminary analyses to achieve adequate cell sizes across categories (see also Waite et al.).

Three measures assessed partnered sexual activities, which NSHAP defines as 'any mutually voluntary activity with another person that involves sexual contact, whether or not intercourse or orgasm occurs.' Only respondents who indicated having had a sexual/romantic partner in the past year were asked these questions. Respondents were asked about the *frequency of sex* in the past 12 months with responses ranging from "none" to "once a day or more." We coded this as 1= "once a month or less," 2= "2-3 times per month," and 3= "at least once a week." Then respondents were asked how often their activities in the last 12 months included *vaginal intercourse* and how often their partners performed *oral sex* with responses for both ranging from "never" to "always." For both measures we coded the responses into 1= "never/rarely," 2= "sometimes/usually," and 3= "always." For all three of these measures, we coded respondents without partners =0.

We conceptualized the next two measures as reflecting a person's underlying level of desire for sexual activity (Waite et al., 2009). Respondents were asked whether the frequency of sexual activity during the past 12 months (or during their last relationship if not partnered) met their expectation. Responses were that respondents has sex "much less often" than desired to "much more often" than desired." We coded these as 1= "less often than," 2= "about as often

as,” and 3= “more often than” desired.¹ Respondents were also asked about the frequency in the past 12 months of solo sexual activity, meaning “stimulating... genitals (sex organs) for sexual pleasure, not with a sexual partner.” Responses ranged from “not at all this year” to “more than once a day;” we coded *masturbation* as 0= “not at all this year,” 1= “less than once a month,” 2= “one to a few times per month,” and 3= “once a week or more.”

The final two measures are attitudes conceptualized to as indicative of respondents’ motivations or “drive” for sexual activity (Allen & Desille, 2017). Respondents were asked how often they *think about sex* with responses ranging from “never” to “several times a day;” we coded this as 1= “less than once a month,” 2= “one to a few times per month,” and 3= “once a week or more.” Respondents were also asked the degree to which sex is an “important part of their lives” with responses ranging from “not at all” to “extremely important;” we coded *importance of sex* as 1= “not at all/somewhat important,” 2= “moderately important,” and 3= “very/extremely important.”

Covariates. Based on prior research, we included indicators for demographic characteristics (Addis et al, 2006; DeLamater & Sill, 2005), marital history (Call et al, 1995; Karraker & DeLamater, 2013), sexual quality (Kwon & Schafer, 2017) and health-related behaviors (Allen & Desille, 2017; DeLamater & Karraker, 2009), known to be associated with older adults’ sexual behaviors, motivations, and attitudes. As reviewed above, we also included measures of health to predict changes in sexual expression over time. These indicators were

¹ At Wave 2 this item was asked in the Leave-Behind-Questionnaire and did not specify that respondents without current partners should report on their last relationship. As a result, 15% of respondents did not provide any answer to this question—83% of whom were not sexually active. Our use of multiple imputation (described below) corrects for missing information, but the slight wording changes between waves mean that the two items are not strictly identical and may be assessing slightly different constructs.

based only on Wave 1 reports— except those for health where we also incorporated change between Waves 1 and 2.

Demographic characteristics included *female*, *age* measured in whole years and centered at 57, a dummy variable for *Nonwhite*, dummy variables for education (*less than high school*, *some college*, and *college or more*, with high school as the reference), and an ordinal measure of *income* (0= less than \$25,000 to 3= more than \$100,000).

Marital history is measured with a dummy variable for being *Married Twice* or more and interval-level current marital *Status Duration* coded in 5-year increments from 1=0-5 years to 10=50 years or more. Given that both partnered and non-partnered older adults are included in our analyses the coding of these measures permitted them to be include simultaneously in the same model.

We used two measure to capture respondents' assessments of sexual quality with their current or most recent partner. Respondents were asked how *Physically Pleasurable* and then how *Emotional Satisfying* they found their relationship. For both questions responses ranged from “not at all” to “extremely.” As both measures were highly skewed toward more positive assessments, we coded each into three categories of 1=only somewhat, 2=very, and 3=extremely pleasurable/emotionally satisfying.

We included several measures of health-related behaviors. Smoking was captured with dummy variables for *Former Smoker* and *Current Smoker*; never smoked was the reference. Respondent reported their alcohol use in terms of the average number of drinks per day that they drank in the last three months. We created two dummy variables for respondents who reported ever drinking and doing so in the last three months—*Moderate Drinking* (0-2 drinks) and *Heavy Drinking* (3 or more drinks); the reference was no drinking in at least the last 3 months.

Respondents were asked how often in the last year they “participated in vigorous physical activity... [such as] sports, exercise classes, heavy housework, or a job that involves physical labor” for 30 minutes or more.” We coded *Vigorous Exercise* with a single dummy variable (=1) for activity 3 or more times per week.” Respondents with a body mass index greater than 30 were coded as *Obese* (=1).

Health was measured with five variables. *Chronic Conditions* was a count of self-reported physician diagnosis with hypertension, arthritis, heart disease, stroke, diabetes, non-skin cancer, and/or chronic lung disease (0-7). *Functional Limitations* was constructed as a dummy variable indicating the respondent had any difficulties expected to last at least three months with any of the following activities: walking several blocks, cross a room, dressing, bathing, eating, toileting, and getting in and out of bed. *Self-Rated Physical Health* and *Self-Rated Mental Health* were measured with standard assessments ranging from 0= “poor” to 4= “excellent.” *Sexual Performance Difficulty* was measured as a dummy variable (=1) if male respondents reported trouble getting/maintaining an erection or female respondents reported difficulty lubricating.

To assess change in health, we compared the measures across Waves. For each of chronic conditions, functional limitations self-rated physical health, self-rated mental health, and sexual performance difficulties we created two dummy variables: *Better* (=1) if the health condition improved between Waves and *Worse* (=1) if the health condition deteriorated between Waves. The reference category for each was thus no change in the health condition.

Analytic Strategy

As noted above, we used Latent Transition Analysis (LTA) to identify the most commonly occurring patterns of older adults’ sexual behaviors and attitudes and assess whether

and how individuals transition across them over time. The LTA jointly estimated: (a) a measurement model relating latent sexual behavior profiles to the observed measures of sexual behavior and desire described above, and (b) the transition probabilities between the latent sexual behavior statuses between Waves 1 and 2. The measurement models generated item-response probabilities indicating the probability of observing a given level of a sexual behavior with each latent status. We restricted the item-response probabilities for the latent statuses to be the same at each Wave to ensure that the substantive meaning of each latent status did not vary across Waves.² The transition probability results show patterns of stability or change in latent statuses of sexual behavior.

A central concern with LTA is how many statuses the investigator should select. To assess the adequacy of models with competing numbers of statuses, we used the Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC), with smaller AIC and BIC values suggesting better model fit of the data. We also examined the Entropy statistic, which indicates the quality of the status classification with values closer to 1 suggesting better status separation (Geiser, 2012). Following Ryoo and colleagues (2018), we analyzed separate Latent Classes Analyses at each Wave to determine the number of classes to test in the longitudinal Latent Transition Analysis. Table 2 presents these fit statistics for models 2-6 statuses. As recommended of Collins and Lanza (2010), we placed more emphasis on parsimony and status interpretability than absolute model fit. As highlighted in Table 1, the BIC suggests a five status model and the AIC a six class model. Based on our examination of their meaningfulness for

² We tested an invariance model which allows the item-response probabilities to be unconstrained at both waves. The AIC and BIC were larger for the unconstrained model suggesting worse model fit. Thus, the item-response probabilities were constrained to be the same at Wave 1 and Wave 2.

describing sexual expression and the notion that the AIC often overestimates the correct number of statuses (Nylund, Asparouhov, & Muthén, 2007), we chose five latent statuses model.

[Insert Table 1 about here]

Following determination of the appropriate number of statuses, our plan of analysis was as follows. First, we estimated a LTA model for the full sample, generating item-response, prevalence of statuses, and transition probabilities. Second, we conducted a multiple-group LTA with gender as the grouping variable to determine differences between men and women.³ Third, we estimated a model incorporating respondents' Wave 1 demographics, marital history, sexual quality, health related behaviors and health to predict their Wave 1 latent status. Finally, we estimated a model adding changes in respondent health between Waves to predict the probability of transitioning to other statuses. All analyses were conducted using *MPlus 8.0*, and we appropriately weighted and adjusted for the complex survey design. We used multiple imputation based on Bayesian estimation to handle missing data, estimating 50 datasets.

RESULTS

Table 2 presents weighted descriptive information for the focal sexual behavior, desire, and motivation, both overall and by gender. We assessed differences between men and women with adjusted *t*-tests for differences in means. Men and women were significantly different for nearly all measures of sexual expression. Men reported more frequent sexual activity and engaging more often in vaginal sex and oral sex. Men desired slightly more frequent sex than did women, but for both men and women, the mean scores on this measure indicated that most people desired slightly more frequent sexual activity. Men reported more frequent masturbation

³ Supplemental analyses estimating LTA models stratified by gender revealed that the five status model was appropriate for both (not shown).

that did women, consistent with their slightly higher desire for more frequent sexual activity. Men indicated thinking about sex more often and attributed it greater importance in their lives than did women (although this later difference was not statistically significant at Wave 1). All measures of sexual behavior, desire, and motivation decreased, for both men and women, between Waves 1 and 2.

[Insert Table 2 about here]

Table 3 showcases the item-response probabilities and prevalence of each of the five latent statuses for the overall sample. First, *sexually active* was largest group among the partnered and the second largest overall (24% at Wave 1). This status was characterized by high probabilities of engaging in most of the sexual behavior indicators, expressed high levels of desire, and held attitudes indicating high motivation for sex. Specifically, respondents in this status had a high probability of having sex a couple of times a month or more, usually having vaginal intercourse, sometimes having oral sex, indicated they were having sex as often as they would like, thought about sex once a week or more, believed sex was very important. Second, *limited* (20% at Wave 1) respondents had sex about once a month or less, but had high rates of vaginal sex and low rates of oral sex when they did have sex, thought about sex a few times a month or less, thought sex was somewhat important or less, and were having sex as often as they desired. The third status was *frustrated* (12% at Wave 1). These respondents were partnered but having sex once a month or less, think about sex once a week or more, and were having sex less often than they would like. This status was the most likely to report any masturbation.

The remaining two statuses captured unpartnered respondents. Respondents were *longing* (13% at Wave 1) if they were not having sex but thought about sex once a week or more, and expressed desire to be having sex. Respondents in this status were also the second most

likely to report any masturbation. The last status was the largest group (30% at Wave 1) and reflected respondents *disinterested* in sex. These respondents reported never masturbating, thinking about sex less than once a month, and felt that sex was at most only somewhat important.

[Insert Table 3 about here]

The transition probabilities for the entire sample are depicted on Table 4. Transition probabilities indicate the degree of change between the latent statuses between Waves. The probability of remaining the Wave 1 latent status at Wave 2 is on the diagonal. *Sexually active* respondents had a relatively high probability (.63) of remaining in the status at Wave 2. Those in the *sexually active* status who did transition were equally likely to transition to *limited* (.16) or *frustrated* (.16) and had low probability of transitioning to the two unpartnered statuses of *longing* (.03) or *disinterested* (.02). *Limited* respondents either stayed in the same status at Wave 2 (.57), provided they remained partners or transitioned to the non-partnered *disinterested* (.34) or *longing* (.03) statuses. Respondents in *frustrated* status either remained in the same status over time (.62) or transitioned to the unpartnered *longing* (.38) status. The unpartnered status of *longing* had a probability of .59 of staying in the same status. If *longing* respondents transitioned, they had the highest probability of transitioning to either *frustrated* (.15) or *disinterested* (.14) and the lowest probability of moving to the *limited* (.08) or *sexually active* (.04) statuses. Finally, the *disinterested* status was the most stable with a high probability (.91) of remaining in *disinterested* status over time. Only a small proportion of people transitioned out of the *disinterested* status to the *limited* (.08) status, which suggested that once people enter the *disinterested* status, it is relatively permanent.

[Insert Table 4 about here]

Table 5 presented the results of the latent transitions for males and females. There were gender differences in the prevalence rates of each latent status at Wave 1. Thirty-two percent of men were classified as *sexually active* compared to only 14% of women. The opposite pattern occurred for *limited* in that only 14% of men were in this status at Wave 1 compared to 27% of women. There was a large gender difference for *frustrated*, with 24% of men in this status but only 4% of women. Unpartnered men (22%) were also more likely to be in the *longing* status compared to women (10%). Finally, 46% of women were classified as *disinterested* at Wave 1 compared to 8% of men.

Several interesting transition patterns should be noted on Table 5. First, both men (.57) and, especially, women (.72) who were classified as *sexually active* at Wave 1 had a relatively high probability of staying in the *sexually active* status. Next, even though it was a small percentage of the total sample of women, those women who were identified as *frustrated* at Wave 1 had a high probability (.61) of transitioning to *sexually active* compared to men (.28). Finally, as in the full sample, both men (.82) and, especially, women (.93) in the *disinterested* status at Wave 1 were highly likely to remain in the status at Wave 2.

[Insert Table 5 about here]

Table 6 illustrates the associations between our demographic, marital history, sexual quality, health-related behaviors, and health covariates and the Wave 1 latent status membership by gender. Only two covariates were significant for men, age and having been married at least twice. Age was negatively associated with being in any of the statuses relative to being in the *disinterested* status. Further, men who were in higher-order marriages were more likely to be classified in the *sexually active* or *limited* statuses compared to the *disinterested* status.

For women, a number of covariates were associated with latent status membership. Age was negatively associated with being in the *sexually active*, *limited sexually*, or *frustrated* statuses compared to *disinterested* status. Compared to those with a high school degree, women who had less than a high school degree were less likely to be in the *frustrated* status, but women with a college degree were more likely to be in the *longing* status. Higher income and longer duration in the current relationship were associated with being in either *sexually active* or *limited* compared to *disinterested*. Relationship pleasure and satisfaction were positively associated with being in the *sexually active* status. Drinking increased the probability of women being in the *frustrated* status compared to *disinterested*. Obesity was negatively associated with the *sexually active* and *limited* statuses. Finally, chronic illness was negatively associated with being classified as *limited*, and limitations of daily activities was positively associated with *limited* status compared to being *disinterested*.

[Insert Table 6 about here]

Lastly, we examined the association between changes in health and transitions between statuses. These (preliminary) results suggested that changes in self-rated mental health was not associated with men's transitions between the various latent sexual expression statuses. To test if including change variables of mental health were associated with status transitions a likelihood-ratio statistic ($2*(LL1-LL2)$) was calculated and a hypothesis test was conducted on a chi-square distribution (see Collins and Lanza (2010) for further discussion). The results indicated that changes in mental health was not significant at the .05 level for men (Likelihood-Ratio Statistic = 47.88; $p > .05$) and marginally significant for women (Likelihood-Ratio Statistic = 51.96; $p < .10$). We will also conduct a similar analysis for physical health and sexual problems.

DISCUSSION

The current study used latent transition analysis to investigate sexual behavior and desire transitions of men and women over time. We identified five distinct latent statuses to describe the combination of older adults' sexual behavior, desire, and motivation: *sexually active*, *limited*, *frustrated*, *longing*, and *disinterested*. Men and women decreased in sexual behavior and desire with age. It is important to note that a substantial minority of both men and women are either classified as sexually active or limited at wave 2 suggesting that even though sexual behavior decreases with age, a large proportion of older adults are still engaging in sexual behavior. Moreover, we identify a nontrivial number of respondents who transition to more sexually engaged status over time, indicating that sexual expression in later life is dynamic. It is important for health practitioners who work with the aging population to consider the fact that many older men and women are still engaging in sexual behavior, desire to be engaging in more activity, and thus may need targeted care. Given the hesitancy of many older adults, especially women, to discuss sexual matters with physicians (Adams 2014), practitioners need to make sexual health a routine part of their care programs and not simply assume that older adults are uninterested.

There are several gender differences that are important to highlight. First, although men are more likely to be classified as such, both men and women in the *sexually active* status are relatively stable over time. Similarly, even though women are more likely to be in the *disinterested* status, this is a stable status for both men and women over time. In other words, even though there are gender differences in the prevalence of the *sexually active* and *disinterested* statuses men and women are similar in their transition behavior. Second, women's sexual behaviors and desires and transitions are more malleable and influenced by demographic factors, prior sexual quality, and health indicators. Men's sexual expression appears only to be associated with age and having multiple marriages. Changes in self-rated mental health did not

significantly predict transitions for men. We plan to test if changes in self-rated physical health and sexual problems influences transitions men's sexual expression. Our results so far are consistent with the notion that sexual expression is central to masculinity (Carpenter 2010) among current cohorts of older adults and far less dependent on contextual factors.

Even though the current study helps to explain how men and women transition in their sexual behavior and desires over time, our study is not without limitations. First, while same-sex couples are an important segment of the population, the NSHAP data do not have a large enough sample size of respondents who are currently in same-sex relations to conduct an extensive analysis. Second, although we include several measures of sexual behavior (which is a strength of the study), there are other important sexual behaviors that are not available in the dataset such as anal sex. Further, at Wave 1 respondents were asked how often they gave oral sex and received oral sex on two separate questions. At Wave 2, respondents were only asked about receiving oral sex. We could not include giving oral sex because of the longitudinal nature of the study. Similarly, questions about sexual and non-sexual touching were not asked consistently across waves, and this precluded their inclusion. Even with these limitations, the current study suggests several avenues for future research. First, there is a need for more research on sexual behavior of older adults that simultaneously considers sexual activity, desires, and motivations. As we show, behaviors and attitudes combine in different ways, and this is important for understanding transitions over time. For example, unpartnered older adults in the *longing* status retain desire even as they are not currently having sex and thus are more likely to transition to status characterized by activity (*active, limited, frustrated*). Second, future research should consider how different statuses and transitions may influence emotional well-being in later life. For example, 1 in 10 older adults were classified as *frustrated*—engaging in partnered sexual

activities less than desired but masturbating relatively often, thinking about sex quite often, and viewing sex as important to their lives. This suggests that for these individuals a fundamental need is not being met and for older adults that are not able to resolve this issue—as evidenced by not transitioning to a more engaged status—may be associated with depression, loneliness, or other emotional health problems. Moreover, the potential for such negative outcomes may be higher for men, as nearly 1 in 4 were classified as *frustrated*. This study is an important step toward understanding the complex gendered nature of sexual behaviors, desires, and motivations over time.

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Table 1. Descriptive Statistics of Sexual Behavior and Desire of the Total Sample and According to Gender

	Total Sample		Males		Females		Diff
	Mean	SE	Mean	SE	Mean	SE	
Frequency of sexual behavior W1	1.12	0.04	1.41	0.04	0.85	0.04	***
Frequency of sexual behavior W2	0.96	0.04	1.21	0.05	0.73	0.04	***
Vaginal intercourse W1	1.47	0.04	1.81	0.06	1.15	0.05	***
Vaginal intercourse W2	1.18	0.04	1.49	0.06	0.90	0.05	***
Oral Sex W1	0.88	0.03	1.12	0.05	0.67	0.03	***
Oral Sex W2	0.81	0.04	1.04	0.05	0.59	0.04	***
Masturbation W1	0.70	0.03	1.00	0.05	0.43	0.03	***
Masturbation W2	0.68	0.04	0.98	0.06	0.40	0.03	***
Think about sex W1	2.12	0.02	2.51	0.02	1.76	0.03	***
Think about sex W2	1.98	0.03	2.37	0.03	1.16	0.04	***
How important is sex? W1	1.87	0.02	2.10	0.03	1.67	0.03	ns
How important is sex? W2	1.67	0.03	1.94	0.04	1.43	0.03	***
Sex frequency ok? W1	1.72	0.02	1.59	0.02	1.83	0.02	***
Sex frequency ok? W2	1.41	0.02	1.37	0.02	1.45	0.03	*

Table 2. *Fit Statistics for Latent Transition Models of Sexual Behavior and Desire*

Wave 1:			
Number of Classes	AIC	BIC	Entropy
2	25547.64	25759.12	0.99
3	24912.71	25232.78	0.88
4	24690.09	25118.75	0.82
5	24469.02	25006.28	0.82
6	24380.36	25026.22	0.79
Wave 2:			
Number of Classes	AIC	BIC	Entropy
2	23188.04	23399.27	0.97
3	22827.28	23146.97	0.89
4	22496.04	22924.21	0.80
5	22375.39	22912.02	0.80
6	22304.17	22949.27	0.80

Table 3. *Item-response Probabilities and Prevalence of Latent Statuses (N = 2245)*

	Latent Status				
	Sexually Active	Limited Sexually	Frustrated	Longing	Disinterested
Item-Response Probabilities					
Frequency of sexual behavior					
No partner	0.00	0.00	0.00	1.00	1.00
Once a month or less	0.03	0.57	0.54	0.00	0.00
2-3 times a month	0.35	0.31	0.28	0.00	0.00
1 times a week or more	0.62	0.12	0.18	0.00	0.00
Vaginal intercourse					
No partner	0.00	0.00	0.00	1.00	1.00
Never/Rarely	0.03	0.13	0.16	0.00	0.00
Sometimes/Usually	0.25	0.26	0.35	0.00	0.00
Always	0.72	0.61	0.50	0.00	0.00
Oral Sex					
No partner	0.00	0.00	0.00	1.00	1.00
Never	0.38	0.72	0.45	0.00	0.00
Rarely/Sometimes	0.44	0.26	0.34	0.00	0.00
Usually/Always	0.18	0.02	0.21	0.00	0.00
Masturbation					
Never	0.54	0.78	0.14	0.34	0.85
Every other month or less	0.20	0.16	0.25	0.19	0.11
1-3 times a month	0.17	0.04	0.35	0.31	0.03
Once a week or more	0.09	0.02	0.26	0.15	0.01
Think about sex					
Less than once a month	0.01	0.32	0.01	0.09	0.82
One to a few times a month	0.16	0.51	0.21	0.38	0.15
Once a week or more	0.83	0.17	0.78	0.53	0.04
How important is sex?					
Somewhat to not at all	0.03	0.49	0.24	0.42	0.88
Moderately	0.34	0.41	0.41	0.28	0.09
Very/extremely	0.63	0.10	0.36	0.31	0.03
Sex frequency ok?					
Much less/less often than would like	0.22	0.28	0.81	0.72	0.48
As often would like	0.73	0.63	0.20	0.26	0.44
somewhat/much more than would like	0.05	0.10	0.00	0.02	0.08
Prevalence of Statuses					
Wave 1	24%	20%	12%	13%	30%
Wave 2	18%	18%	13%	15%	36%

Table 4. *Transitions from Wave 1 (row) to Wave 2 (column) Latent Statuses (N =2245)*

	Sexually Active	Limited Sexually	Frustrated	Longing	Disinterested
Sexually Active	0.63	0.16	0.16	0.03	0.02
Limited Sexually	0.00	0.57	0.00	0.03	0.34
Frustrated	0.00	0.00	0.62	0.38	0.00
Longing	0.04	0.08	0.15	0.59	0.14
Disinterested	0.00	0.08	0.00	0.00	0.91

Table 5. Transitions from Wave 1 (row) to Wave 2 (column) Latent Statuses According to Gender (N =2245)

Males:

	Sexually Active (24%)	Limited Sexually (11%)	Frustrated (27%)	Longing (22%)	Disinterested (16%)
Sexually Active (32%)	0.57	0.08	0.17	0.04	0.14
Limited Sexually (14%)	0.15	0.45	0.02	0.07	0.31
Frustrated (24%)	0.28	0.00	0.72	0.00	0.00
Longing (22%)	0.07	0.11	0.25	0.55	0.02
Disinterested (8%)	0.05	0.09	0.03	0.01	0.82

Females:

	Sexually Active (10%)	Limited Sexually (25%)	Frustrated (2%)	Longing (10%)	Disinterested (52%)
Sexually Active (14%)	0.72	0.10	0.06	0.04	0.09
Limited Sexually (27%)	0.02	0.62	0.00	0.05	0.32
Frustrated (4%)	0.61	0.03	0.25	0.00	0.11
Longing (10%)	0.02	0.32	0.08	0.57	0.01
Disinterested (46%)	0.00	0.07	0.00	0.00	0.93

Table 6. Health and Demographic Variables Predicting Latent Status at Time 1 for Males and Females

	Sexually Active		Limited Sexually		Frustrated		Longing		Disinterested
	Coefficient		Coefficient		Coefficient		Coefficient		Reference
<i>Males:</i>									
<i>Effects of Health and Demographic Variables on Membership into Time 1 Profiles</i>									
Age	-0.17	***	-.12	**	-.32	*	-.11	*	-
Nonwhite	-0.05		-.63		-.1		-.96		-
Less than HS	0.31		-.62		-88.64		-.58		-
Some College	0.33		-.34		16.87		-.08		-
College	0.38		-.67		17.43		.17		-
Income	0.46		.23		1.07		.06		-
Multiple marriages	1.13	*	1.12	*	2.09		.96		-
Status Duration	-0.09		.10		.06		.06		-
Relationship Pleasure	0.61		-.23		1.26		-.06		-
Relationship Satisfaction	-0.16		-.09		-3.23		-.98		-
Former Smoker	-0.16		-.12		.90		-.54		-
Current Smoker	-1.13		-.69		1.30		-.99		-
Heavy Drinking	0.58		.45		.61		.57		-
Moderate Drinking	0.61		.25		2.83		.50		-
Exercise	0.71		.15		.18		.51		-
Obese	-0.29		-.25		.35		-.41		-
Chronic Illness	-0.16		.02		-.97		-.12		-
ADL	0.2		-.24		1.79		.21		-
Self Rated Physical Health	0.51		.29		-.65		-.14		-
Self-Rated Mental Health	0.03		-.05		2.13		.15		-
Sex Problems	-1.06		-.12		1.00		-.29		-
<i>Females:</i>									
<i>Effects of Health and Demographic Variables on Membership into Time 1 Profiles</i>									
Age	-.15	***	-.11	***	-.24	*	-.02		-
Nonwhite	.26		.35		-.65		.17		-
Less than HS	-1.01		-.06		-25.72	***	-.12		-
Some College	.08		.25		5.53		.33		-
College	.66		.64		7.73		1.49	**	-
Income	.84	**	.73	**	.90		.34		-
Multiple marriages	.86		0.7		1.94		.05		-
Status Duration	.26	**	0.31	***	-0.05		.01		-
Relationship Pleasure	1.38	**	.01		.15		.44		-
Relationship Satisfaction	.64	*	.42		.30		-.13		-
Former Smoker	.30		.05		.64		.49		-
Current Smoker	.19		.04		.30		-.42		-
Heavy Drinking	1.40		-.07		4.59	*	.43		-
Moderate Drinking	-.01		-.09		2.82	*	.43		-
Exercise	.92		.24		.04		.42		-
Obese	-.80	*	-.60	*	-.83		.09		-
Chronic Illness	-.28		-.21	*	.68		.04		-
ADL	.12		.54	*	-.37		.28		-
Self Rated Physical Health	-.30		.12		.95		.06		-
Self-Rated Mental Health	.04		-.24		-.11		-.06		-
Sex Problems	-1.02		-.69		-.92		-.38		-