Asian Women
December 2018, Vol. 34, No. 4, pp. 53-75, https://doi.org/10.14431/aw.2018.12.34.4.53

The Effect of Health and Functional Limitation on Sexual Life Satisfaction: Evidence from Elderly Korean Couples

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Abstract

We analyzed the effects of elderly couples' physical and cognitive health and the limitations in independent living on their sexual life satisfaction. Using Korean nationally representative data of 1,930 couples aged 65 or older in 2011, we conducted Actor-Partner Interdependence Model (APIM) analysis. The results revealed that the worse physical and cognitive functions of the older adults caused limitations in independent living, and these hindered their sexual life satisfaction. Specifically, we found that the sexual life satisfaction for husbands was influenced only by their own worse physical and cognitive functions. However, sexual life satisfaction for wives was affected by both their own and their spouses' worse cognitive function. The results suggested that it was important to prevent and delay physical and cognitive health decline to improve the sexual life satisfaction of elderly couples.

Key words

Korean elders, gender, linked lives perspective, sexual life satisfaction

Introduction

Sexual life encompasses vaginal intercourse for reproduction and various sexual activities including petting, oral sex, and masturbation (DeLamater & Karraker, 2009). Sexual life provides a variety of meanings to elderly couples including power, the vitality of life, pleasure, the flower of life, the necessities of life, the expression of love between couples, the passage of sympathy, emotional satisfaction, seasoning and flavoring life, usefulness as a woman (Lee, 2014; Lee, 2016). The sexual life satisfaction of the elderly is closely related to ego-integrity (Choi, 2008), depression (Ganong & Larson, 2011), couple relations (DeLamater, Hyde, & Fong, 2008; Lodge & Umberson, 2012), life satisfaction (Hwang & Shin, 2012), and successful aging and happiness (Karraker, DeLamater, & Schwartz, 2011). Although

there is no official statistical data on the sexual life of the Korean elderly, previous studies using in-depth interviews and surveys with convenience sampling consistently reported that many Korean elderly people had active sexual lives (Shin & Park, 2014). A study conducted on American elderly couples showed that approximately 70.1% had engaged in sexual activities within the past 12 months (Karraker & DeLamater, 2013). The results of these studies revealed that although sexual functioning had deteriorated and physical health had declined with age, libido was maintained (DeLamater & Sil, 2005) and the elderly could continue various types of sexual activities into their 70s, 80s, and 90s (DeLamater & Moorman, 2007; Lodge & Umberson, 2012) with the help of sexual enhancers (e.g., erectile-dysfunction medicine and vaginal lubricants) (Kingsberg, 2002).

Sexual life is an important part of the life of the elderly and many elderly people have an active sexual life. However, a previous report (Kim & Lee, 2013) showed that only 30.3% of South Korean elderly were satisfied with their sex lives. Although the majority of elderly people are dissatisfied with their sex lives, there is little social support to improve the sexual satisfaction of the elderly and it is not easy to publicize the topic in the fields of academia, media, or politics (Gott & Hinchliff, 2003). Biological age in itself is not a direct obstacle to having a sexual life (Gott & Hinchliff, 2003). However, the cognitive, psychological, and social schemes that a sex life symbolizes, such as vitality, pleasure, beauty, and youth, have become popularized by the mass media. Consequently, the wrinkled face of the elderly individual or the no longer trim body is mistakenly perceived as having little sexual attraction (Montemurro & Gillen, 2013; Montemurro & Siefken, 2014). The sexual activities of the elderly have been suppressed in South Korea because ageism and a male-oriented sexual regime have dominated society (Laumann et al., 2006). Our objective in this study was to pose the necessity of developing counseling and education, nursing, and long-term care services for improving the elderly's satisfaction with their sexual lives.

This is a starting point for developing sexual counseling and sex education programs that raise awareness of the theme of a sexual life in elderly individuals, and ultimately lead them to experiencing a pleasant and satisfying sexual life. Our intention was to evaluate how physical and cognitive health and the limitations in living independently as a husband and a wife mutually affected the sexual satisfaction of elderly couples. The uniqueness

of this study was to analyze survey data representing the elderly living in South Korea according to the couple as a unit, and to simultaneously estimate the effects on each party; by focusing on the physical and cognitive problems and the mediating effects of the limitations in independent living caused by those problems it is possible to highlight the gender differences in these relationships.

Literature Review

Theories: The Linked Lives Perspective and Intersectionality

The linked lives perspective is one of the core principles of life-course theory and it is useful for explaining the relationship between the health of elderly couples and their satisfaction with their sex lives (Angela, 1996; Lodge & Umberson, 2012). According to this perspective, the couples' health is closely related and the results of their interactions are accumulated over the life course because the family members of a family share daily life and exchange care (Elder, 1994). This perspective suggests that physical and cognitive health, and the sexual life of couples are closely related and the pattern is more distinctive for elderly couples who have shared their daily life and sexual life for decades (Biddle & Yap, 2010; Elder, 1998; Franks, Lucas, Stephens, Rook, & Gonzalez, 2010). When one half of an elderly couple has restrictions on the activities of daily living (ADL) or the instrumental activities of daily living (IADL), the spouse becomes a primary caregiver (Wolff & Kasper, 2006), and it becomes harder to maintain a sexual life in the same way as before (Lee, 2014). Consequently, deterioration in physical or cognitive health and the restrictions of independent living can hinder both husband and wife's satisfaction in their sexual life (Kim & Hong, 2016; Lee, 2014; Yoo, 2017).

It is possible to understand the sexual life of the elderly couples better by integrating the linked lives perspective and the perspective of intersectionality (Lodge & Umberson, 2012). The concept of intersectionality is primarily used in women's studies; however, the main idea of this perspective is to respect the diversity of sub-groups that are sub-groups whose identities may be suppressed by belonging to a wider group. From this perspective, a husband and a wife may give different meanings and values to their sex life (Hirayama & Walker, 2011; Karraker & DeLamater, 2013;

Karraker, DeLamater, & Schwartz, 2011) owing to the gender ideologies of masculinity and femininity, which have been constructed in their contemporary manner for several decades (Lodge & Umberson, 2012; Waite, Laumann, Das, & Schumm, 2009). Although this relationship between exogenous and endogenous variables can be explained logically according to the two theories (i.e., linked lives and intersectionality), there is no empirical study that evaluates how the limitations in physical and cognitive health affect a couple's satisfaction in their sexual life in Korea. Our aim is to provide empirical evidence for this relationship in an East Asian context.

Physical and Cognitive Health, Independent Living, and Sexual Life Satisfaction in Elderly Couples

This section will examine what is known about this topic by reviewing previous studies on the physical and cognitive health problems, limitations in independent living, and sexual life satisfaction of elderly couples. Moreover, it will identify the issues to be evaluated further in this study. Some studies have argued that sexual life satisfaction varies according to the age, gender, and household income of the elderly husbands and wives (Kim, 2018; Kim & Lee, 2013; Yoo, 2017). However, other studies have reported contradictory results, namely that sexual life satisfaction can be maintained at a high level although the pattern of sexual relations changes and frequency decreases as the couple ages (Kim & Lee, 2013; Lee, 2014; Lindau et al., 2007; Lodge & Umberson, 2012). Some research has claimed that deteriorating health rather than biological age influences the sexual life directly and negatively (Karraker, DeLamater, & Schwartz, 2011; Shin & Park, 2014). However, there are arguments that take an opposing perspective. For example, Waite et al. (2009) reported that mental health is more closely related to dissatisfaction with sexual life than physical health. Previous studies have also revealed that the prescribed medicine for chronic diseases causes a loss of libido only in female patients and that diagnosed chronic diseases do not affect various sexual activities including petting, oral sex, and masturbation (DeLamater & Moorman, 2007). Moreover, physical sexual dysfunctions can be overcome by using sexual function enhancers (Kingsberg, 2002). Overall, many researchers agree that the elderly individual's gender is related to their sexual functioning, libido,

and sexual life satisfaction. However, different opinions exist on whether the main factor hindering sexual life satisfaction is biological age, physical health, or mental health. It is difficult to find a dyadic-structure study that evaluates the effects of the husband or wife's health on their own sexual life satisfaction in elderly Korean couples.

The results of previous studies did not agree on the relationships among age, physical health, cognitive functioning, and the sexual life satisfaction of the elderly. It is possible that the limitations in independent living, which occur when age, physical health issues, or deteriorated cognitive functions exceed a certain level, may affect the sexual life satisfaction of a partner. This is because the limitations in independent living due to a physical health issue or worsened cognitive functions can have adverse effects on the marital relationship between an elderly person with a health problem and a spouse providing care. The elderly, who have health issues due to chronic illness or who use long-term care services, also have a desire for a sexual life (Doll, 2013). An elderly person, who needs long-term care, and his or her spouse have more severe difficulties in engaging in a sexual life than those who live independently, thus their sexuality is neglected and excluded from the subject of sexual life support (Doll, 2013; Harris, Adams, Zubatsky, & White, 2011). Studying the sexual lives of the elderly who have limitations in independent living and identifying measures to support them is therefore particularly a timely issue (Bentrott & Margrett, 2011; Frankowski & Clark, 2009).

The Current Study

We examined whether the linked life perspective actually explained the relationship between the health of the elderly couple and sexual life satisfaction; our aim was to complement and develop several tasks identified by previous studies conducted on the sexual life satisfaction of the elderly. First, most previous studies conducted surveys or in-depth interviews with the elderly using a specific facility in a specific area and adopting convenience sampling; these studies recommended that follow-up studies should use data representing the whole population (Hwang & Shin, 2012; Yoo, 2017). Therefore, our intention was to verify the results of previous studies by using the Survey on Elderly Life Conditions (SELC) in 2011, which is representative of the elderly in South Korea.

Second, the sexual life and satisfaction of a married person should be considered as a bilateral relationship, but previous studies analyzed data at the individual level and could not adequately reflect the characteristics of the spouse (Kim & Lee, 2013). Therefore, we analyzed the physical and cognitive health of the husband and the wife, their limitations in independent living, and how their individual sexual life satisfaction influenced their partner by using the Actor-Partner Interdependence Model (APIM) (Cook & Kenny, 2005).

Third, sexual life satisfaction in the later period of life is not solely determined by biological age or the level of physical and cognitive functioning, and it may differ because of the occurrence of limitations in independent living. However, it is difficult to identify previous studies examining the effects of the limitations caused by the deteriorated physical and cognitive health of a husband or a wife and how they affect sexual life satisfaction. Therefore, we evaluated how the limitations in the couple's independent living affected each other's sexual life satisfaction by focusing on the mediating effects.

Lastly, our aim was to conduct analyses emphasizing intersectionality whereby the elderly were divided into various sub-groups having diverse and different attributes, because it was not clear how the factors affecting their sexual life satisfaction differed specifically according to physical health, cognitive function, actor, partner, and gender.

Objectives and Research Questions

Our objective was both to seek ways to improve the sexual life satisfaction of the elderly and guarantee the sexual rights of those who had poor physical and cognitive health conditions and limitations in independent living. To accomplish this objective, we analyzed the data of 1,930 couples over 65 years old from the SELC in 2011, which represented the elderly of South Korea, and conducted an extended version of the APIM analysis.

The specific research questions were as follows.

- Question 1: How do the physical health problems and worse cognitive functions of elderly couples directly affect the sexual life satisfaction of the husband and the wife?
- Question 2: What are the mediating effects of the limitations in in-

dependent living due to physical health problems and the worsened cognitive functions on the individuals' sexual life satisfaction?

- Question 3: Are there direct effects of the physical health problems and worsened cognitive function on sexual life satisfaction and do the indirect effects mediated by independent living differ by actor, partner, or gender?

Method

Data and Subjects

The subjects in this study were 1,930 couples representative of elderly couples older than 65 years living in South Korea. We used the SELC (2011) conducted by the Ministry of Health and Welfare and the Korea Institute for Health and Social Affairs to analyze information regarding sexual life satisfaction, cognitive functioning, independent living, age, and household income. The SELC in 2011 was carried out according to Article 5 of the Welfare of the Aged Act; it targeted 10,674 elderly people (65 years old or older) residing in 3,142 survey districts created by applying a stratified two-stage cluster sampling method to cities and provinces. Sixty-eight professionally trained investigators visited the houses and interviewed subjects; the information obtained was subsequently verified by phone interviews with over 91% of respondents. We obtained consent from participants before collecting sensitive information on sexual life satisfaction and informed participants that they could voluntarily refuse to answer an uncomfortable question or end their participation in the study at any time. Furthermore, investigators were trained on these issues before conducting the interviews. We also received Institutional Review Board (IRB) approval from our institution so as to comply with established research ethics before conducting the study and analyzing the data obtained. The SELC data collected through this process in 2011 are not only representative and credible but also include a variety of material about the sexual life satisfaction, physical and cognitive health, independent living, and social and demographic characteristics of the couples thus it provided data suitable for the analytic purposes of this study.

The elderly couple in a dyadic structure (rather than an individual elderly person) was used as a unit of analysis because we examined the bilateral

relationship between a husband and a wife. To analyze the couple unit, we excluded 2,508 subjects who did not have a spouse, who had a spouse but one member of the couple was younger than 65, or those where only one member participated in the SELC in 2011. Most of the subjects excluded from the study had either had their spouses die or had spouses who were too under 65. Moreover, 68 subjects were excluded from the study because their spouses were very ill (e.g., dementia and long-term hospitalization) and they could not answer the SELC questions directly. An additional 77 subjects were excluded from the analysis because they denied answering questions related to sexual life satisfaction, a dependent variable of this study. Finally, we used 1,930 couples (total 3,860 individual persons: 1,930 husbands and 1,930 wives), who were over 65 years old and responded to the survey as study subjects.

Measures

Endogenous Variables

Sexual life satisfaction of a husband and a wife.

Sexual life satisfaction was evaluated by one item ("Overall, how satisfied are you with your current sexual life?") and each husband and wife selected one of *very satisfied, satisfied, average, unsatisfied,* and *very unsatisfied.* These responses were coded as 5, 4, 3, 2, and 1, respectively; a higher score meant higher satisfaction with their sexual life.

Mediators: limitations in the independent living of a husband and a wife.

When a respondent indicated that the person needed the other's help for any of the seven ADL items or any of the ten IADL items, ADL or IADL was scored as 1. When a respondent could do all seven ADL items or all ten IADL items, ADL or IADL was scored as 0. The seven ADL items are 1) dressing, 2) washing face, teeth cleaning, and shampooing, 3) bathing or showering, 4) eating, 5) lying down, getting up, and moving, 6) using the bathroom, cleaning after using a toilet, and dressing, and 7) controlling bladder and bowel movements. The ten IADL items are 1) dressing, 2) household chores, 3) preparing meals, 4) laundry, 5) taking prescribed medicine on time, 6) financial management, 7) going out to nearby areas, 8)

making purchasing decisions, paying money, and receiving change, 9) making and receiving telephone calls, and 10) using transportation.

Exogenous Variables

Physical health problems.

The latent variable of physical health problems consisted of the number of chronic diseases diagnosed by a medical doctor that had persisted over three months, and the number of prescribed medications that the subject had been taking for more than three months. Chronic disease, the first observation variable, included 34 diseases (possible range: 0–34) encompassing circulatory, endocrine, musculoskeletal, respiratory, sensory, cancer, digestive, genitourinary, and other disease categories. In this study, subjects had a minimum of 0 and a maximum of six diseases. Medication, the second observation variable, ranged from 0 to 10. The latent variables of physical health problems consisted of chronic diseases and medication. Greater value indicated that there were more physical health problems.

Worse cognitive function.

The cognitive functions of the elderly were measured using the Mini-Mental State Examination-Korean Version (MMSE-KC) scale (range: 0–30). This was coded by multiplying the raw score of the cognitive function by −1 to make it easy to interpret the results according to the physical health score (higher score = poorer health). In other words, a higher cognitive function score meant a more severe decline of cognitive function.

Control variables: husband age, wife age, and household income.

We included age and household income as control variables in the analytic model of this study because previous studies reported that they were closely related to physical and cognitive health, and to sexual life satisfaction (Kim & Lee, 2013; Yoo, 2017). The age of the study subjects ranged between 65 and 101. The first, second, third, fourth, and fifth quintiles of annual gross household income were below 7.63, 764–11.93, 11.94–18.49, 18.50–31.70, and over 31.71 KRW million, respectively.

Data Analysis

Figure 1 shows the conceptual framework of the study.

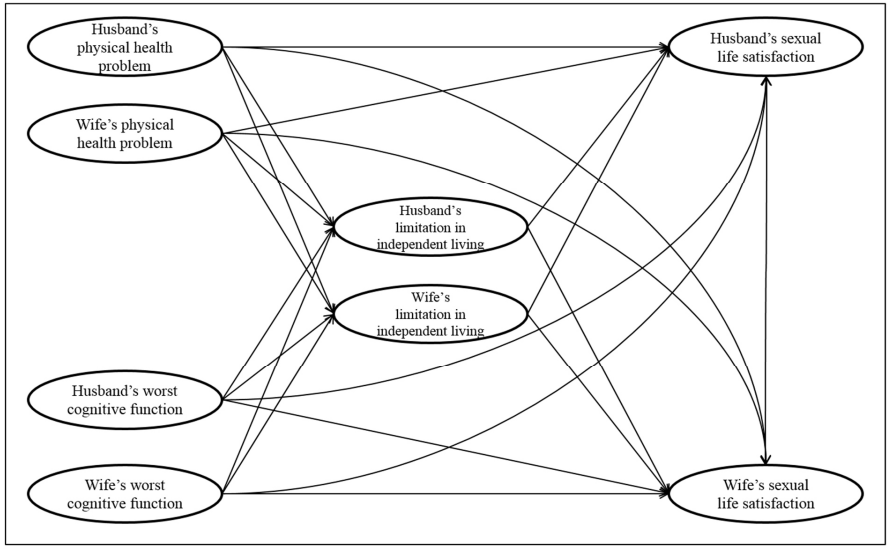

Figure 1. The analytical framework for the study.

This conceptual framework assumed that a decrease in the physical and cognitive health of a husband or a wife would cause limitations in independent living and these factors could affect the sexual life satisfaction of either the husband or wife. We used an extended version of APIM for this analysis. The strength of APIM is that it can quantify the effects of an actor's attributes on a partner and vice versa by using multiple people having close interactions as a group (Cook & Kenny, 2005). The application of APIM, which considers the characteristics of both people, is appropriate because the sexual life of elderly couples involves the physical and emotional interaction between a husband and a wife; a spouse becomes a primary caregiver when the other person has physical and cognitive limitations in independent living. The extended version of APIM was used to reflect the mediating effects in the interdependent relationship between the husband and the wife because the physical health problem and the decline in cognitive function could induce limitations to independent living, and these factors could, at the same time, influence the sexual life satisfaction

of the couple. It also has several advantages as it is based on full information maximum likelihood method (FIML), which includes missing cases of exogenous variables, minimizes measurement error by using the latent variables of physical health problems, and can consider multiple endogenous variables, including parameters, at the same time (Duncan, Duncan, & Strycker, 2013; Enders & Bandalos, 2001).

We conducted the following intensified process according to the research questions. To evaluate the first research question, we estimated the direct path actor-partner effect of the physical health problem and the worse cognitive functions of the couple on the sexual life satisfaction for each partner and compared the estimated values. To address the second research question, we evaluated the mediating effects of the limitations in independent living on the path from worse physical health problems and cognitive functions of the couple to sexual life satisfaction. Lastly, the third research question constrained each path of the direct and the indirect effects of the limitations in independent living that were estimated for previous questions, and compared the differences in model fitness x^2 between the free model, which set all paths free, and the other models. We conducted identity verification and compared the specific differences in physical health, cognitive function, actor, partner, and gender.

Results

Descriptive Statistics

Table 1 shows the results of the descriptive statistics and the correlation analysis of the variables.

Table 1
Descriptive Statistics and Pearson Correlations among Variables (N = 1,930)

Variables	1)	2)	3)	4)	5)	6)	7)	8)	9)	10)	11)	12)	13)
1)	1.00												
2)	.53	1.00											
3)	-.10	-.05	1.00										
4)	-.06	-.06	.29	1.00									
5)	-.13	-.07	.89	.24	1.00								
6)	-.08	-.08	.27	.83	.28	1.00							

Variables	1)	2)	3)	4)	5)	6)	7)	8)	9)	10)	11)	12)	13)
7)	-.14	-.10	.21	.07	.21	.06	1.00						
8)	-.13	-.10	.10	.24	.07	.24	.11	1.00					
9)	-.15	-.11	.10	.06	.11	.07	.35	.03	1.00				
10)	-.11	-.13	.01	.10	-.01	.12	.05	.31	.29	1.00			
11)	-.08	-.04	.09	.11	.07	.11	.20	.10	.27	.23	1.00		
12)	-.08	-.04	.08	.12	.07	.13	.17	.15	.21	.30	.78	1.00	
13)	.05	.05	.04	-.10	-.02	-.09	-.06	-.06	-.18	-.18	-.20	-.18	1.00
M	3.04	3.05	2.17	2.80	1.82	2.25	0.11	0.13	25.2	23.8	75.5	72.1	3.10
SD	0.91	0.87	1.53	1.62	1.44	1.53	0.31	0.34	3.92	3.99	5.13	4.67	1.25
Range	1-5	1-5	0-6	0-6	0-9	0-10	0-1	0-1	0-30	5-30	65-101	65-90	1-5

Note. 1) Husband's sexual life satisfaction, 2) Wife's sexual life satisfaction, 3) The number of chronic diseases of husband, 4) The number of chronic diseases of wife, 5) The number of medications of husband, 6) The number of medications of wife, 7) Husband's limitations in independent living, 8) Wife's limitations in independent living, 9) Husband's worse cognitive function, 10) Wife's worse cognitive function, 11) Husband's age, 12) Wife's age, and 13) Annual household income.

The mean sexual life satisfaction of the husband and that of the wife were similar to each other at approximately 3.0. The mean number of chronic diseases was 2.2 and 2.8 for the husband and wife, and the mean number of medications taken was 1.8 and 2.3, respectively. The results showed that the wife had more physical health problems. Approximately 10% of subjects had limitations in ADL and IADL: the percentage was higher for the wife (husband = 11% and wife = 13.0%). The mean cognitive function scores were 25 for the husband and 24 for the wife. When the cognitive functions of the subjects were determined based on the MMSE-KC scores, 20% of the elderly showed deteriorated cognitive functions. However, people who are admitted to a hospital or a nursing home owing to severely deteriorated cognitive function are excluded from the SELC, which examines the elderly living in local communities. Therefore, only 3% of the total subjects were confirmed by doctors as having dementia. The mean age of the husband was 75.5 years and that of the wife was 72.1 years. The results of the correlation analysis between variables showed that the sexual life satisfaction of the husband and that of the wife were closely related ($r = .53$, $p < .001$). The correlations between chronic diseases and taking medication were also very high ($r = .83$ for wife, $r = -.89$ for husband, $p < .001$) and the results revealed that they were appropriately used as observational variables to constitute the latent

variables of physical health problems. The results indicated that the age of the couple, the worse cognitive function, and the limitations in independent living were highly correlated ($p < .001$).

Results of APIM Analysis

Table 2 and Figure 2 show the results of the structural equation modeling of the physical health problem of each subject, the direct effects of the worse cognitive function, and the indirect effects of limitations in independent living, affecting sexual life satisfaction. The root mean squared error of approximation (RMSEA) for the model fit was .06, comparative fit index (CFI) was .98, Tucker-Lewis Index (TLI) was .93, and standardized root mean square residual (SRMR) was .01, which were all excellent.

Table 2
Actor-Partner Interdependence Model Result on Sexual Life Satisfaction Among Korean Elderly Couples (N = 1,930)

Paths	Husband			Wife		
	b	*SE*	*β*	B	*SE*	*β*
SS ← Husband's PHP	-0.06***	0.02	-.09	-0.02	0.02	-.04
SS ← Wife's PHP	-0.00	0.00	-.00	-0.02	0.02	-.04
SS ← Husband's WCF	-0.08***	0.03	-.09	-0.05*	0.03	-.06
SS ← Wife's WCF	-0.05	0.03	-.05	-0.08**	0.03	-.10
SS ← Husband's LIL	-0.21**	0.07	-.07	-0.15*	0.07	-.06
SS ← Wife's LIL	-0.26***	0.07	-.10	-0.14*	0.07	-.05
LIL ← Husband's PHP	0.04***	0.01	.17	0.01	0.01	.02
LIL ← Wife's PHP	-0.00	0.01	-.01	0.05***	0.01	.22
LIL ← Husband's WCF	0.10***	0.01	.32	-0.03**	0.01	-.07
LIL ← Wife's WCF	-0.02**	0.01	-.07	0.10***	0.01	.29
SS ← Husband's age	-0.00	0.01	-.02	0.00	0.01	.01
SS ← Wife's age	0.00	0.01	.01	0.00	0.01	.02
SS ← Household income	0.01	0.02	.01	0.01	0.02	.02
DCF ← Husband's age	0.01*	0.00	.07	-0.00	0.00	-.02
LIL ← Wife's age	0.00	0.00	.05	0.00	0.00	.06

Paths	Husband			Wife		
	b	*SE*	*β*	B	*SE*	*β*
LIL ← Household income	0.00	0.01	.01	0.00	0.01	.01
x^2 (*df*)	174.72 (22)***					
RMSEA	0.06					
CFI	.98					
TLI	.93					
SRMR	.01					

Note. CFI = Comparative fit index; WCF = Worse cognitive function; LIL = Limitation in independent living; PHP = Physical health problem; RMSEA = Root mean squared error of approximation; SRMR = Standardized root square residual; SS = Sexual life satisfaction; TLI = Tucker-Lewis Index.
*p < .05. **p < .01. ***p < .001.

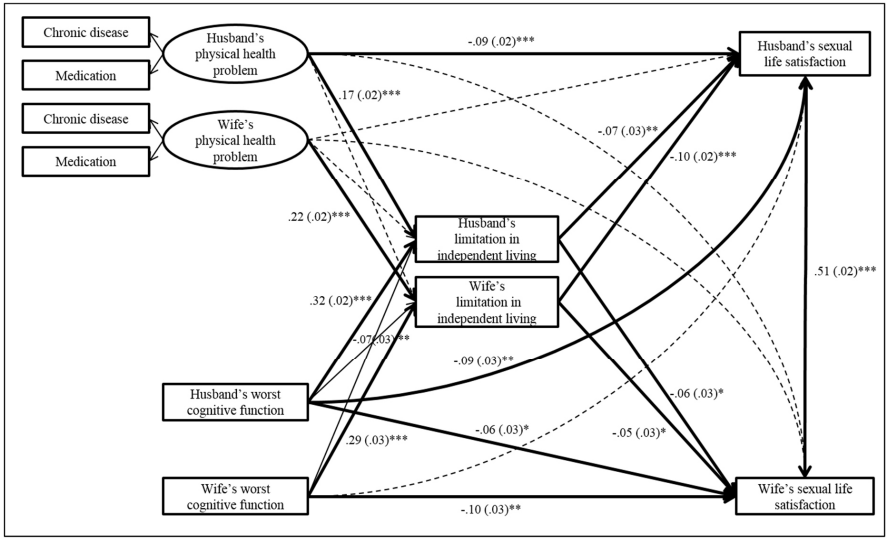

Figure 2. Actor-partner interdependence model results on sexual life satisfaction among Korean elderly couples. *Notes.* Significant paths are solid lines, and non-significant pathways are dotted lines. Husband's age, wife's age, and household income are controlled in these results. Path coefficients in this figure are standardized values.
*p < .05. **p < .01. ***p < .001.

The Effects of Physical Health Problems and Worse Cognitive Function on Sexual Life Satisfaction

As a first research question, we evaluated the results of actor-partner effects of pathways that directly connected sexual life satisfaction with physical health problems and worse cognitive function. First, having more physical health problems decreased the sexual life satisfaction of the husband, and showed significant direct actor effects (β = -.09, p < .001), but the sexual life satisfaction of the wife was not significantly influenced by own physical health problems. Second, the sexual life satisfaction of the husband and of the wife did not show significant differences because of the direct physical health problems of the partner. Third, a more severe decline in the cognitive function of the husband lowered his sexual life satisfaction and revealed significant and direct actor effects (β = -.09, p < .01) while the more severe decline in the cognitive function of the wife decreased her sexual life satisfaction and indicated significant and direct actor effects (β = -.10, p < .01). Fourth, the sexual life satisfaction of the husband was not significantly affected by the worse cognitive function of the wife directly but that of the wife significantly decreased with the worse cognitive function of the husband, and showed direct partner effects (β = -.06, p < .05). The age of the husband, the age of the wife, and the household income, which were used as control variables, did not have significant effects on sexual life satisfaction for either actor effects or partner effects.

Indirect Actor-Partner Effects Influencing Sexual Life Satisfaction Mediated by Limitations in Independent Living

The second research question examined the results of actor-partner effects in the pathway indirectly connecting worse cognitive function to sexual life satisfaction mediated by the limitations of independent living. First, the husband's physical health problems (β = .17, p < .001) and worse cognitive function (β = .32, p < .001) began to limit his independent living. The limitations in the husband's independent living had significant negative effects on both husbands' sexual life satisfaction (β = -.07, p < .01) and wives' sexual life satisfaction (β = -.06, p < .05). Like the husband, the wife's physical health problems (β = .22, p < .001) and worse cognitive function (β = .29, p < .001) also led to limitations in her independent liv-

ing, and the limitations in independent living negatively influenced her husband's sexual life satisfaction (β = -.10, p < .001) and her sexual life satisfaction (β = -.05, p < .05). Although the husband's old age mediated the limitation in independent living of the husband, and indirectly affected the sexual life satisfaction of the husband and the wife negatively, other control variables did not have even indirect significant effects.

Intersectionality: Differences in Actor, Partner, and Gender Effects

In addition, we conducted identity verification for each pathway to evaluate if the directs effects of the physical health problem, the worse cognitive function on sexual life satisfaction, and the mediating effects of the limitations in independent living differed by actor, partner, and gender. First, the husband's sexual life satisfaction was similarly influenced by his physical health problem and worse cognitive function [$\triangle x^2$ (1) = .62], but it was not significantly affected by the wife's physical health problem and worse cognitive function. Therefore, there was no direct partner effect. Secondly, the wife's sexual life satisfaction was similarly affected by her own worse cognitive function and the husband's worse cognitive function [$\triangle x^2$ (1) = .58], but there was no significant difference between actor and partner effects because neither party was significantly affected by own or partner's physical health problems. In summary, the husband's sexual life satisfaction was directly affected more by his own health condition than by his partner's health condition regardless of physical health and worse cognitive function. In contrast, the wife's sexual life satisfaction was only influenced directly by her own worse cognitive function and that of her spouse.

The results of identity verification on mediator effects revealed that both husband and wife showed significantly larger effects of worse cognitive function than of physical health problems on the limitations in independent living [$\triangle x^2$ (2) = 57.73, p < .001], and the actor effects were significantly larger than the partner effects [$\triangle x^2$ (4) = 246.42, p < .001]. However, the effects of the limitations on independent living, a parameter, or on the husband's and the wife's sexual life satisfaction were not significantly different for actor, partner, or gender. The results indicated that worse cognitive function rather than physical health problems, and own rather than partner's physical and cognitive levels induced the limitations in independent

living. However, after occurring, the limitations in independent living had a negative effect on sexual life satisfaction regardless of actor, partner, or gender.

Discussion

Using a structural equation model, we analyzed how physical health problems and worse cognitive functions directly affected the sexual life satisfaction of elderly couples, and how the interdependent relationship indirectly influenced it by mediating the limitations in independent living.

The most important finding of this study was that physical health problems and worse cognitive functions mediated the limitations in independent living to hinder own and his/her partner's sexual life satisfaction. As it has been considered natural that people have more physical health problems and that their cognitive functions decline with age, people may have accepted decreased sexual life satisfaction as part of the natural aging process. Although aging is an inescapable developmental process, the results of this study showed that biological age had little effect on sexual life satisfaction. In particular, the factors found in this study that hinder sexual life satisfaction could be delayed or eliminated, so sexual dissatisfaction among the elderly should not be assumed as a matter of course. For example, physical health problems and worse cognitive function can be prevented, delayed, or treated, and the limitations in independent living can be addressed by the society. It is urgently necessary to prevent and delay physical health problems and worse cognitive functions through intervention programs in order to improve sexual life satisfaction (Karraker & DeLamater, 2013; Waite et al., 2009). Moreover, it is necessary to expand nursing, long-term care, family education, and family counseling services to elderly couples suffering from physical health problems and worse cognitive functions, and provide sexual counseling and sexual education programs for couples with limited capacity for independent living (Bentrott & Margrett, 2011).

Although a wife's worse cognitive function led to limitations in independent living and lowered the husband's sexual life satisfaction, the husband's sexual life satisfaction was not directly affected by the physical and cognitive health level of his wife but was mainly determined by his own physical and cognitive health levels. The results may suggest that elderly Korean males still have a self-centered unilateral sexuality that emphasizes

sexual function and that they do not understand their spouse sufficiently (Kim & Hong, 2016).

Unlike the husband who had few partner effects but large actor effects, the wife's sexual life satisfaction was directly or indirectly affected by the husband's worse cognitive function as well as her own worse cognitive function. In other words, the results showed that the wife's sexual life satisfaction was influenced by both her husband's and her cognitive function level and limitations in independent living. The results can be understood according to the results of Lee (2014), who showed that an elderly male enjoyed sexual life in various ways including sexual intercourse with a spouse, watching an adult video, and masturbation, while an elderly female mainly had a sexual relationship with a spouse, and valued the emotional and relational aspects of that relationship. It is interesting that the partner effects influenced wife's sexual life satisfaction as much as the actor effects. In addition, it is noteworthy that the physical health problems of the husband and the wife did not directly affect the wife's sexual life satisfaction. The results of the study revealed that the sexual life satisfaction of the elderly female is not solely determined by her physical health status (DeLamater, Hyde, & Fong, 2008) and that cognitive functions are important in sexual life satisfaction. The results were also consistent with the results of Waite et al. (2009), who emphasized the effects of mental health over those of physical health. Therefore, maintaining the husband's cognitive functions and independent living should be supported to effectively enhance the wife's sexual life satisfaction.

We can make some suggestions for future research based on the results of this study. First, we excluded the elderly who did not have spouses for various reasons such as being widowed, divorced, or single because the objective of this study was to examine the interdependent relationship of elderly couples. However, while the elderly can maintain a sexual life without a spouse (Lindau et al., 2007) they may experience greater difficulties in having a sexual life than the elderly person living with a spouse (DeLamater & Karraker, 2009; Jeon, Oh, & Kim, 2017; Kim & Lee, 2013). Therefore, follow-up studies are expected to study the sexual life of the elderly without spouses in detail and seek ways to improve their sexual life satisfaction.

Second, the data need to be updated by repeating the primary survey. Moreover, the new survey and analysis should use more advanced measurement tools and the analysis should be more sophisticated. Since the original

data were collected in 2011, the results may be different from the contemporary situation of elderly Koreans in 2018. However, it was necessary to use the data before 2011 because the SELC measured sexual life satisfaction only until that date. Therefore, it is necessary to conduct a further survey that examines the sex life of elderly Korean people and compares that with the past results. In addition, future studies should measure sexual life satisfaction more elaborately by using more advanced scales than were used here. Physical health can be measured by taking into account not only the number but also the types of medicine taken. These limitations should be considered when interpreting and generalizing the results of this study.

Lastly, we could not discuss the policy support measures for enhancing the sexual life of elderly couples with limited independent living ability. The results, however, showed that wives' limitations in independent living lowered husbands' sexual life satisfaction as well as their own sexual life satisfaction. Consequently, we expect that future studies will develop nursing, recuperation, counseling, and education services to enhance the sexual life satisfaction of elderly couples having limitations in independent living; effective measures to address these should be introduced based on the scientific evidence.

Conclusion

It is necessary to prepare for specific nursing, long-term care, family education, and family counseling services that can enable the elderly to maintain a satisfactory sexual life. However, this study is meaningful insofar as its results provide the basis for necessary policy interventions to improve the sexual life of the elderly by evaluating the direct, indirect, and mediating effects of own and partner's physical and cognitive functions on sexual life satisfaction. We expect that this topic will be discussed more actively in women's studies and family studies to raise awareness that the elderly can enjoy a sexual life and maintain sexual life satisfaction despite limitations in independent living due to deterioration in the physical and cognitive health of the husband or wife.

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