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The relationship between depression, self-efficacy, social support, and health-promoting behaviors in Korean single-household women

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ABSTRACT

This descriptive, cross-sectional study purposed to identify the relationship between depression, self-efficacy, social support, and health-promoting behaviors in adult single-household women in Korea. An online survey was completed by 204 adult single-household women in Korea from November to December 2019. The structured questionnaire included items measuring depression, health-related self-efficacy, social support, health-promoting behaviors, and demographic and health-related characteristics. Descriptive statistics were computed, and mediation, moderation, and moderated mediation analyses were conducted. The average age of the participants was 34.38, and the average duration of living alone was 7.13 years. The health-promoting behavior of single-household women scored 125.85 in average within the possible score range of 52–208. It was verified that social support has a moderated mediating effect that regulates the mediating effect in the pathway by which depression affects health-promoting behaviors through self-efficacy. In conclusion, self-efficacy was found to play a mediating role between depression and health-promoting behaviors, and social support had a moderated mediating effect on the path from depression to health-promoting behaviors through self-efficacy. To encourage the health-promoting behaviors of single-household women, interventions targeting both increased social support and self-efficacy are suggested.

1. Introduction

Household types in Korea have changed rapidly over the last decade. Three-or four-person households have decreased while one- or two-person households are increasing (Kim et al., 2018). A single household refers to a household in which an individual lives alone and is financially independent. The proportion of single households in Korea increased from 23.9% in 2010 to 29.3% in 2018 and is expected to account for 33.8% of all households in 2030 (Statistics Korea, 2019). This growing trend is a global phenomenon. In 2017, about one-third of households in the European Union and around 40% of households in the Nordic countries were single-person households (Eurostat, 2017).

People living alone, especially women, are known to have a higher risk of health issues. Women who suddenly become single households due to divorce, separation, or bereavement face a greater chance of suffering from socioeconomic difficulties than men (Chae and Kim, 2019), leading to a vulnerability in maintaining a healthy lifestyle. It was found that women in single households often fail to receive medical treatment when needed, have a low rate of cancer screening, and have a low quality of life related to health (Chae and Kim, 2019).

Despite the vulnerability of single households, health-related studies on single female households are very limited. Studies of single households have mainly focused on the elderly and the study of housing and housing policy aspects (Byun et al., 2015; Posel et al., 2020). In Korea, a few health-related studies have been conducted in recent years albeit with limited research topics, e.g., households with metabolic syndrome (Kim, 2018) or depression (Kang, 2019), but no health-related studies have focused on women. In addition, studies on health behaviors or quality of life related to the health of single households have mostly been conducted through secondary analysis (Chae and Kim, 2019; Gu, 2019; Lee et al., 2018).

1.1. Health behaviors of single households

People living alone are vulnerable to a variety of health behavior issues. Considering that one of the health benefits of marriage is spousal monitoring of health behaviors, less monitoring and discouragement of risky behaviors and less encouragement of a healthier lifestyle may be

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expected among those living alone (Raymo, 2015). A previous study reported that single households have higher levels of problematic alcohol use (Joutsenniemi et al., 2007). In a Korean study, people living alone engaged in fewer healthy behaviors and reported lower rates of maintenance of abstinence from smoking and weight control compared to those living with others (Kim et al., 2020). Single households also tend to have an unbalanced diet and nutrient intake (Heo and Sim, 2016). In particular, it has been suggested that young adults are relatively more vulnerable. Young people living alone were identified as a difficult group to engage in health management because of some of their common features: lack of concern for health, inevitable neglect of health, and unhealthy lifestyles.

1.2. Depression, self-efficacy, social support, and health-promoting behaviors

Living alone is known to be a risk factor for depression. A potential association between living alone and low positive mental health was found in three out of the four studies in a systematic review regarding single households and mental health (Tamminen et al., 2019).

Health-promoting behaviors are defined as multidimensional patterns of behaviors that maintain and promote individuals' well-being and life satisfaction, and promote self-realization (Walker et al., 1987). They are active actions to attain higher levels of health, which means changing lifestyles mainly through changes in attitudes. Depression is known to disrupt the practice of health behaviors and is associated with less healthy lifestyles in many dimensions. Smoking prevalence was reported higher among those with depression (Weinberger et al., 2020). Depression is also a risk factor for alcohol consumption. Among those reporting depressive symptoms, sensitivity to the motivational impact of negative mood on alcohol-seeking behavior was greater, increasing vulnerability to alcohol dependence (Hogarth et al., 2018). Depression is also associated with inactivity (Bishwajit et al., 2017).

Self-efficacy, i.e., the belief in one's own ability to perform actions directed toward a certain goal (Bandura, 1977), was found to mediate the influence of depression on self-care of diabetes patients (Devarajooh and Chinna, 2017) and medication adherence in patients with hypertension (Son and Won, 2017). When challenged with obstacles, depressed individuals might experience self-doubt in the form of lower self-efficacy (Son et al., 2014). Self-efficacy also affects health-promoting behaviors. The simple transfer of health-related knowledge or information does not guarantee it will be acted upon; self-efficacy is known to affect the likelihood of an individual performing an action because their self-recognition and judgment of their abilities have important effects on their motivation and thus behavioral outcomes (Pender and Pender, 1987). A *meta*-analysis reported that self-efficacy was one of the most powerful factors influencing health-promoting behaviors (Sheeran et al., 2016); this finding was supported by subsequent empirical studies (Açıkgöz Çepni and Kitiş, 2017; Guntzviller et al., 2017).

The presence of social support is an important feature of single households. Previous studies have found that single households are more vulnerable in terms of intimate relationships compared to multi-person households (Choi et al., 2016; Noh, 2018). Social support is a concept that includes the total amount of positive feelings of affection, acceptance, and interest received through meaningful interaction with others as well as resources such as emotional stability, information, and practical help (Segrin and Domschke, 2011). Social support helps individuals adapt (Barrera, 1986) and protects individuals both directly and through buffer effects on stress (Cohen and Syme, 1985). In addition, enhanced self-esteem, responsiveness, and motivation, induced by social support, have a positive impact on disease-related emotional conditions (Strickland et al., 2007), which may affect an individual's health behaviors. Social support has been confirmed to have a significant impact on the practice of health-promoting behaviors in various populations (Sim, 2005; Kim and Park, 2015; Ha and Choi, 2014).

In summary, the relationships between depression, self-efficacy, social support, and health-promoting behaviors have been studied separately and were found to be significant. However, previous results have a limitation in that even though a few studies confirmed the path by which depression affects health behaviors through self-efficacy, the possible moderating influence of social support in this pathway has not been tested.

This study aimed to identify the relationship between depression, self-efficacy, social support, and health-promoting behaviors in adult single-household women in Korea. In this study, we tested a parsimonious moderated mediation model (Fig. 1). We proposed integrating two assumptions in one model: (a) depression influences health-promoting behaviors through self-efficacy (mediation), and (b) the strength of the effect of self-efficacy on health-promoting behaviors depends on the level of social support (moderation).

2. Methods

2.1. Design, participants, and data collection

This cross-sectional study involved 204 adult single-household women in Korea who were registered in one of three online communities for single households. The contents shared in the communities were mainly small talks or information on daily lives for socializing. Inclusion criteria were single-household adult women who lived alone and were financially independent.

Data were collected from self-report structured questionnaires administered through an online survey link from November to December 2019. A notice of recruitment was posted in three online communities for single households; people interested in participating were asked to follow the link or QR code specified in the notice to access the survey screen.

This study received full ethical approval from the institutional review board (IRB No. Y-2019–0150) at the institute with which the authors are affiliated.

2.2. Measures

Health-promoting behaviors were measured using the Health

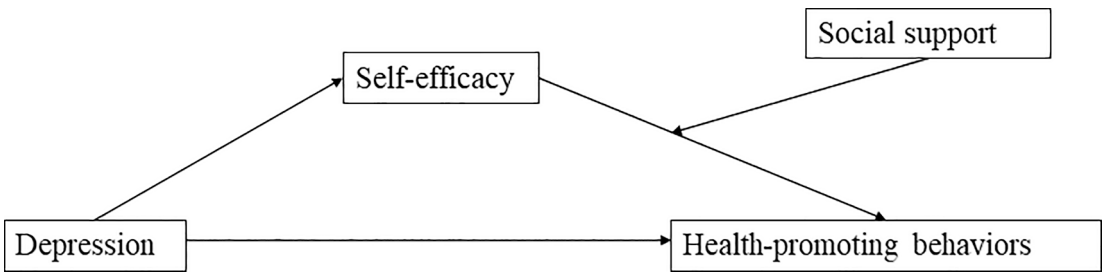

Fig. 1. Conceptual framework of the study.

Promoting Lifestyle Profile II (HPLP II), developed by Walker et al. (1987) and translated and modified by Yun and Kim (1999). It consists of 52 questions grouped into 6 sub-categories. The higher the score, the higher the performance of health-promoting activities. HPLP II of Korean version (1999) had a reliability of Cronbach's α = 0.91; the present study showed a reliability of α = 0.96.

The Patient Health Questionnaire-9 (PHQ-9), developed by Kroenke et al. (2001) and translated by Han et al. (2008) was used to measure depression. It consists of nine questions asking how often the respondent has experienced situations that meet the diagnostic criteria for depression in the last two weeks. Participants were asked to rate each item on a 4-point Likert-type scale, with higher scores indicating higher levels of depression. For screening purposes, this questionnaire suggests that 6 or more out of 27 points is the cutoff point for depression (Lee et al., 2014). The reliability was found to be α = 0.86 in Han et al.'s (2008) translation study, and α = 0.89 in the present study.

The Self-Rated Abilities for Health Practices Scale developed by Becker et al. (1993) and later translated and modified by Choi and Moon (2005) was used to measure self-efficacy. This questionnaire specifically measures health-related self-efficacy, consisting of 28 questions in 4 sub-categories. Participants were asked to rate each item on a 4-point Likert-type scale, with higher scores indicating higher self-efficacy. Choi and Moon (2005) found the reliability to be α = 0.83; in the present study it was α = 0.94.

Social support was measured using the scale developed by Park (1985) and translated and modified by Song (1992). It consists of 25 questions grouped into 4 sub-categories. The higher the score, the higher the level of social support. Both Park (1985) and Song (1992) found it had a reliability of α = 0.97; this study also found it had a reliability of α = 0.97.

Among the demographic and health-related characteristics, eight items measured age, education level, occupation, monthly income, marital status, years of living alone, and major social relationships; nine items measured health-related characteristics for height, weight, stress, current disease, influenza vaccination, cervical and breast cancer screening, smoking, and drinking.

2.3. Data analysis

The collected data were analyzed using SPSS ver.25.0 and Hayes' PROCESS macro ver.3.5. Descriptive statistics were computed, and mediating, moderating, and moderated mediating effect analyses were conducted as proposed by Preacher et al. (2007). To verify the moderated mediating effect, the mediating and moderating models were tested first, and then the integrated model was analyzed. PROCESS Model 14 was used to test the moderated mediating effect, which is a conditional process model that examined whether the indirect effect of depression on health-promoting behaviors through self-efficacy is conditional on social support. Bootstrapping with 5,000 resamples was conducted to test the significance of indirect effects (95% confidence intervals [CI]; Hayes, 2018). Missing data were not encountered since all questionnaire items were set as being mandatory to answer.

3. Results

3.1. General characteristics of the participants

Table 1 presents general characteristics and key variables of the participants.

Table 1
General characteristics of the participants.

Variable	Categories	Mean ± SD or N (%)	Maximum and minimum values
Age (years)		34.38 ± 8.20	22–62
	20–29	76(37.3)	
	30–30	76(37.3)	
	≥40	53(26.0)	
Education level	≤High school	18(8.8)	
	≥college	186(91.2)	
Occupation	Manager, professional	66(32.4)	
	Office worker	91(44.6)	
	Other	38(18.6)	
	Not working	9(4.4)	
Monthly Income (USD)		2,568.81 ± 1908.11	0–24,545.45
Marital Status	Never married	180(88.2)	
	Others (Separated, divorced, widowed, others)	24(11.8)	
Years of living alone		7.13 ± 5.87	1–25
	<5	90(44.1)	
	5–9	54(26.5)	
	≥10	60(29.4)	
Most frequent contact person	Family	85(44.5)	
	Boyfriends/ girlfriends	90(47.1)	
	Others	16(8.4)	
Contact frequency	≥once a week	184(90.2)	
	<once a week	20(9.8)	
Stress	Not stressed	21(10.3)	
	A little stressed	81(39.7)	
	Stressed	76(37.3)	
	Very much stressed	26(12.7)	
Current Disease	None	149(73.0)	
	Yes	55(27.0)	
Influenza vaccination†	No	124(60.8)	
	Yes	80(39.2)	
Breast cancer screening‡ (n = 53)	No	15(28.30)	
	Yes	38(71.7)	
Cervical cancer screening§	No	88(43.1)	
	Yes	116(56.9)	
Body Mass Index		20.95 ± 2.71	16.67–30.30
	<18.5	30(14.7)	
	18.5–22.9	132(64.7)	
	23.0–24.9	21(10.3)	
	≥25.0	21(10.3)	
Alcohol drinking	Non-drinker	35(17.2)	
	Normal drinker	144(70.6)	
	High risk drinker	25(12.3)	
Current smoking	No	186(91.2)	
	Yes	18(8.8)	
Depression (possible score range: 0–27)		6.59 ± 5.60	0–26
	Non-depression	107(52.5)	
	Depression	97(47.5)	
Self-efficacy (possible score range: 28–112)		82.75 ± 12.91	36–111
Social support (possible score range: 25–125		85.00 ± 16.92	27–122
Health-promoting behaviors (possible score range: 52–208)		125.85 ± 27.18	67–190

(N = 204).
†Influenza vaccination: within the past 1 year.
‡Breast cancer screening: within the past 2 years.
§Cervical cancer screening: within the past 3 years.

3.2. Mediating effect of self-efficacy in the path from depression to health-promoting behaviors

PROCESS Macro Model 4 by Hayes (2018) was used to examine the mediating effect of self-efficacy in the relationship between depression and health-promoting behaviors among single-household women in Korea (Table 2). Depression had a significant effect on self-efficacy (β = -1.206, p <.001), and self-efficacy had a significant effect on health-promoting behaviors (β = 1.513, p <.001), indicating that self-efficacy mediates the relationship between depression and health-promoting behaviors. In addition, the direct effect of the pathway between depression and health-promoting behaviors decreased from −2.333 (p

Table 2
Mediating effect of self-efficacy in the relationship between depression and health-promoting behaviors.

	β	SE	T	P	LLCI	ULCI
Model 1 (dependent variable: health-promoting behaviors)						
Depression	−2.333	0.300	−7.784	0.000	−2.923	−1.742
Model 2 (dependent variable: self-efficacy)						
Depression	−1.206	0.138	−8.721	0.000	−1.479	−0.934
Model 3 (dependent variable: health-promoting behaviors)						
Depression	−0.508	0.252	−2.012	0.046	−1.005	−0.010
Self-efficacy	1.513	0.109	13.835	0.000	1.298	1.729

Abbreviations: LLCI, lower limit confidence interval; ULCI, upper limit confidence level.

Table 3
Verification of the indirect effect of self-efficacy between depression and health-promoting behaviors.

Effect	β	SE	LLCI	ULCI
Total effect	−2.333	0.300	−2.923	−1.742
Direct effect	−0.508	0.252	−1.005	−0.010
Indirect effect	−1.825	0.244	−2.320	−0.010

Table 4
Moderating effect of social support in the relationship between self-efficacy and health-promoting behaviors.

	β	SE	t	p	LLCI	ULCI
Model 1 (dependent variable: health-promoting behaviors)						
Self-efficacy	1.412	0.136	10.403	0.000	1.144	1.679
Social support	0.316	0.099	3.181	0.002	0.120	0.512
Model 2 (dependent variable: health-promoting behaviors)						
Self-efficacy X Social support	0.008	0.004	1.996	0.047	0.000	0.016
R^2 change resulted from the addition of the interaction variable				R^2 0.008	f 3.983	P 0.047

Abbreviations: LLCI, lower limit confidence interval; ULCI, upper limit confidence level.

<.001) in Model 1 to −0.508 (p <.05) in Model 3, indicating the mediating effect of self-efficacy. To validate the indirect effect, data were tested through bootstrapping. The result shows that the indirect effect is significant considering that there is no zero between LLCI and ULCI (Table 3).

3.3. Moderating effect of social support in the path from self-efficacy to health-promoting behaviors

PROCESS Macro Model 1 by Hayes (2018) was used to examine the moderating effect of social support on the relationship between self-efficacy and health-promoting behaviors among single-household women in Korea (Table 4). Both self-efficacy (β = 1.412, p <.001) and social support (β = 0.316, p <.01) had a significant effect on health-promoting behaviors. The interaction variable of self-efficacy and social support had a significant effect on health-promoting behaviors (β = 0.008, p <.05), indicating the moderating effect of social support. This means that the effect of self-efficacy on health-promoting behaviors depends on the degree of social support. Considering the coefficient values in Models 1 and 2 (all βs > 0), social support has an amplifying effect. In addition, the amount of change in R^2 resulting from the addition of the interaction variable was 0.008 (p <.05), which was statistically significant. The results verify the moderating effect of social support on the relationship between self-efficacy and health-promoting behaviors.

The pattern of the interaction effect between self-efficacy and social support for health-promoting behaviors is illustrated in Fig. 2. In all the low, moderate, and high social support cases, the increase in health-promoting behaviors was significant, with a positive slope as self-efficacy increased. The slope of increase in health-promoting behaviors according to self-efficacy was steeper when social support was higher. This indicates that social support affects health-promoting behaviors more directly when self-efficacy is high.

According to Johnson-Neyman plot for interaction shown in Fig. 3, the regression coefficient of the mediation was statistically significant in all levels of social support score.

3.4. Moderated mediating effect of social support in the relationship between depression, self-efficacy, and health-promoting behaviors

PROCESS Macro Model 14 by Hayes (2018) was used to examine the moderated mediating effect of social support on the relationship between depression, self-efficacy, and health-promoting behaviors among single-household women in Korea (Table 5). Depression negatively affected self-efficacy (β = -1.206, p <.001) in Model 1. After controlling for depression, the effects of self-efficacy, social support, and the interaction of self-efficacy and social support on health-promoting behaviors were assessed in Model 2. The amount of change in R^2 resulting from the

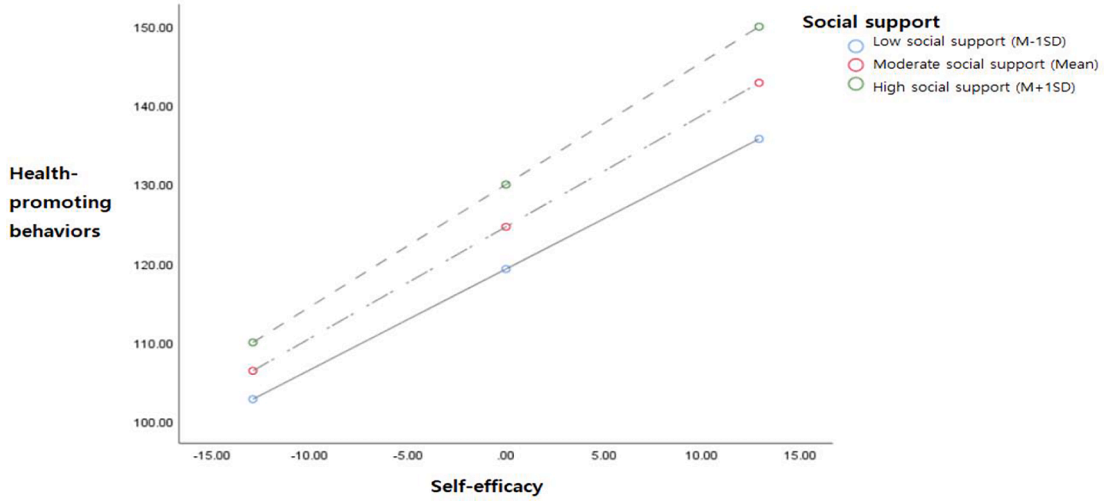

Fig. 2. Interaction effect between self-efficacy and social support for health-promoting behaviors.

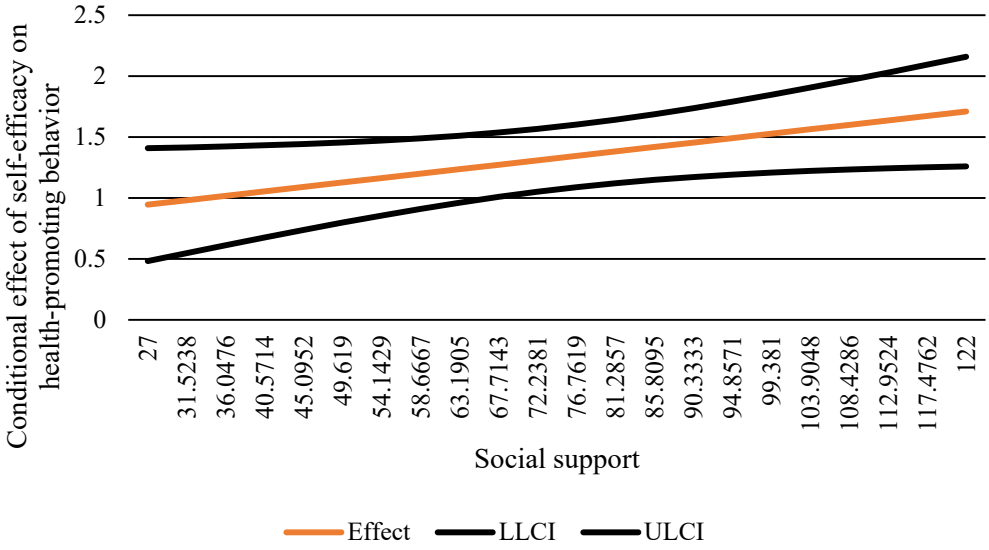

Fig. 3. Conditional effect of self-efficacy on health-promoting behavior at values of social support.

Table 5
Moderated-mediating effect of social support.

	β	SE	t	p	LLCI	ULCI
Model 1 (dependent variable: self-efficacy)						
Depression	−1.206	0.138	−8.721	0.000	−1.479	−0.934
Model 2 (dependent variable: health-promoting behaviors)						
Depression	−0.436	0.247	−1.764	0.079	−0.924	0.052
Self-efficacy	−0.436	0.333	1.902	0.059	−0.023	1.292
Social support	−0.385	0.345	−1.114	0.267	−1.066	0.296
Self-efficacy X Social support	0.008	0.004	2.052	0.042	0.000	0.016
R^2 change resulted from the addition of the interaction variable				R^2 0.008	F 4.210	P 0.042

Abbreviations: LLCI, lower limit confidence interval; ULCI, upper limit confidence level.

Table 6
Index of moderated mediation.

	Index	BootSE	BootLLCI	BootULCI
Social support	−0.010	0.005	−0.019	−0.001

addition of the interaction variable was 0.008 (p =.042), which was statistically significant. The moderated mediation effect is significant as 95% CI does not include zero (Table 6). The results verified the moderated mediating effect of social support on the path whereby depression affects health-promoting behaviors through self-efficacy.

According to Johnson-Neyman plot for interaction shown in Fig. 4, the regression coefficient of the moderating variable was statistically significant in all levels of social support score.

4. Discussion

In this study, a moderated mediating effect was analyzed to examine whether the social support of single-household women in Korea impacted the mediating effect of self-efficacy in the relationship between depression and health-promoting behaviors.

As a result of the moderated mediation analysis, it was verified that social support has a moderated mediating effect that regulates the mediating effect of self-efficacy in the pathway by which depression affects health-promoting behaviors. This implies that social support has an impact on the influence of depression on health-promoting behaviors through self-efficacy. Specifically, the higher the social support, the

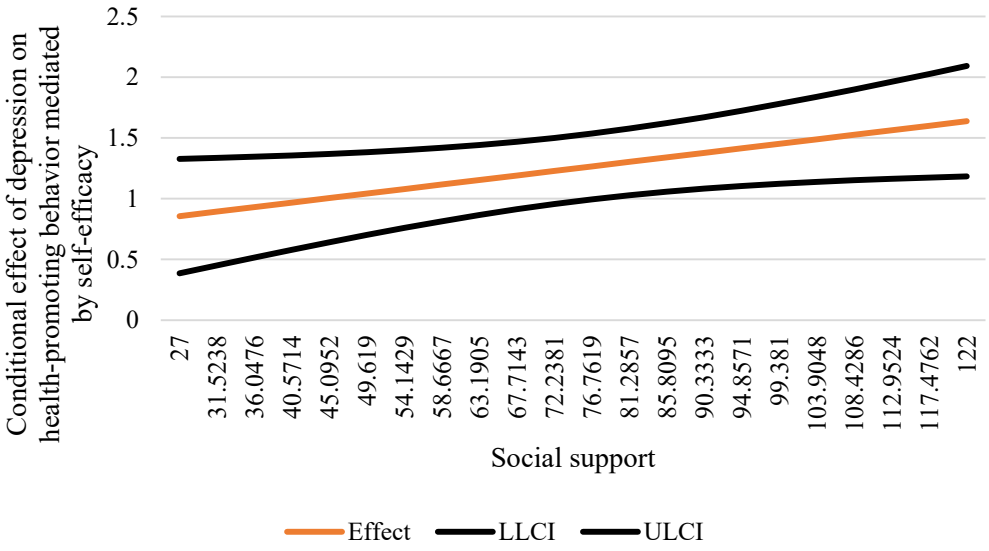

Fig. 4. Conditional effect of depression on health-promoting behavior mediated by self-efficacy at values of social support.

higher the influence of depression on health-promoting behaviors through self-efficacy. If single-household women receive low social support while experiencing depression, it is relatively unlikely that this will lead to higher levels of health-promoting behaviors, even if self-efficacy increases. On the other hand, even when experiencing depression, if the social support level is high, it can strengthen the influence of the path leading to health-promoting behaviors when proper interventions increasing self-efficacy are provided.

The level of social support of single-household women in the current study was found to be lower than that of married middle-aged Korean women (Lee and Jeon, 2011). This supports prior studies stating that people living alone are more vulnerable in terms of close human relationships (Choi et al., 2016). On the other hand, some studies found that young people living alone invest more time in social activities and interact more frequently with their surroundings (Lee and Lee, 2014), suggesting that social contact patterns vary with age. While young single households are familiar with social exchanges through social network services and have a higher chance that they will only live alone for a short period, middle-aged single households are likely to maintain their state of living alone for the long term. This implies that it is necessary to take an approach to promote diverse social networks depending on the age and type of single households. It also suggests that the quality of relationships must be considered, not only the amount of time spent with others or the frequency of contact.

The analysis revealed that self-efficacy partially mediated the relationship between depression and health-promoting behaviors. This means that the effect of depression on health-promoting behaviors can be explained and modified by self-efficacy. In other words, single-household women with low depression tend to have high self-efficacy, which can increase health-promoting behaviors. This result supports Pender's Health Promotion Model (Parsons et al., 2011), which explains that an individual's personal factors lead to perceived self-efficacy, and then to health-promoting behaviors. In addition, it is in line with prior empirical studies suggesting that self-efficacy has a significant effect on health-promoting behaviors (Sheeran et al., 2016; Açıkgöz Çepni and Kitiş, 2017; Guntzviller et al., 2017).

Regarding depression, previous studies have shown that single-household women are vulnerable to depression (Tamminen et al., 2019; Posel et al., 2020). Depression among participants in the current study was also found to be higher than previous studies using the same questionnaire, which investigated middle-aged Korean women and men (Lee, 2018) and adults living in Chiapas, the poorest state in Mexico (Arrieta et al., 2017). This shows that the level of depression of single-household women in Korea surpasses cultural and economic difficulties.

The health-promoting behavior of single-household women was confirmed to be at a low level compared to previous studies of female college students (Byeon and Oak, 2008) and workers (Song et al., 2012) in Korea. It was also lower than that of Iranian women of reproductive age (Bakouei et al., 2017) and that of female adults living in rural areas in the U.S. (Adams et al., 2017). This supports previous studies that identified a low level of health-promoting behaviors in single households (Heo and Sim, 2016; Heo, 2018), and also the study of Kang and Lee (2016), which discovered low overall health levels of those living alone and raised the need for health support.

This study has meaningful implications in that it provides evidence on the roles of self-efficacy and social support in the relationship between depression and health-promoting behaviors in single-household women. Depression could reduce self-efficacy, which could negatively affect health-promoting behaviors. The low level of health-promoting behaviors induced by this pathway can cause health problems in a growing number of single-person households, making it an important task to promote health-related self-efficacy. It is worth noting the possibility of further maximizing the effectiveness of interventions to increase self-efficacy by considering the interaction between social support and self-efficacy. It is necessary to seek ways to increase social support by considering the lifestyles and living environments of single-household women. Rather than simply increasing the frequency of contact with others, strategies should be developed to promote in-depth and positive interactions to enable them to experience quality social relationships.

This study has some limitations. First, the age of the participants in this study varied widely, ranging from 22 to 62 years. The main variables in this study, such as social support and health-promoting behaviors, may vary greatly depending on age group. Future studies should examine the characteristics of single-household women and find implications in detail by analyzing them according to age group. Second, this study targeted single-household women active in online communities and thus they might be a group with higher levels of social support than women in general single households. Therefore, the results of this study may be interpreted with caution, and future studies with a representative sample of single-household women need to be conducted. Third, the cross-sectional design of the study precludes causal inference, and the cross-sectional data inevitably produced biased estimates considering that mediation requires longitudinal construction (Maxwell and Cole, 2007). Finally, although there are sub-categories in the majority of measures in the study, data were analyzed using the uni-category composite measures. This may imply that some understanding of the relationships was lost.

CRediT authorship contribution statement

Jeongok Park: Conceptualization, Methodology, Writing – review & editing, Supervision, Funding acquisition. **Hyojin Lee:** Formal analysis, Investigation, Data curation, Writing – original draft, Visualization, Project administration.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

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Ethical Approval

This study received full ethical approval from the institutional review board (IRB No. Y-2019-0150) at the institute with which the authors are affiliated.

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