Original Research

Effects of depression, self-efficacy, and sexual function on quality of life in middle-aged Korean men

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Abstract

Background: This study aimed to examine the relationship between depression, self-efficacy, sexual function, and quality of life in middle-aged Korean men, and to identify which of these factors affect their quality of life. **Methods**: Participants were 216 middle-aged Korean men, aged 41–64 years. Data were collected from October 23, 2020, to November 15, 2020, from three small and medium-sized enterprises, four government offices, university alumni associations, and meetings. Study variables were depression, self-efficacy, sexual function, and quality of life of middle-aged men. **Results**: There was a negative correlation between quality of life and depression (r = –0.51, $p < 0.001$), while self-efficacy (r = 0.52, $p < 0.001$) and sexual function (r = 0.35, $p < 0.001$) showed a positive correlation. Depression had a significant negative correlation with self-efficacy (r = –0.31, $p < 0.001$) and sexual function (r = –0.30, $p < 0.001$). Self-efficacy was positively correlated with sexual function (r = 0.27, $p < 0.001$). Model 1 included general characteristics that affected the quality of life, two of which were found to have significant effect: monthly household income and subjective health status. The explanatory power was 21.6% (F = 10.86, $p < 0.001$). Model 2 added depression, self-efficacy, and sexual function, and showed that subjective health status, depression, and self-efficacy had a significant effect on quality of life. The explanatory power increased to 43.6% (F = 19.49, $p < 0.001$). **Conclusions**: Depression, self-efficacy, and sexual function affect the quality of life of middle-aged Korean men. Therefore, these variables should be considered when establishing an intervention strategy to improve the quality of life for this group.

Keywords: middle age; men; depression; self-efficacy; sexual function; quality of life

1. Introduction

Middle-aged men often encounter socioeconomic and physical challenges. Middle-aged men often play a significant role in the economic stability and well-being of their families, which they may find burdensome [1]. Middle-aged men's quality of life may deteriorate due to a decrease in their economic power as a result of the job instability caused by retirement and the stress of raising children and caregiving [2]. In addition, as they undergo role changes at this turning point of their lives, they may experience a sense of disappointment, frustration, loss, and alienation, affecting their quality of life [3]. Most existing studies have analyzed the relationship between diseases, such as rectal cancer [4], prostate cancer [5], hypogonadism [6], and male sexual function and quality of life. The relationship between sexual function and quality of life for men with these diseases is very important, however, further research on other determinates of quality of life in middle-aged men is also required. To our knowledge, most extant studies on the quality of life of middle-aged people have focused on menopausal women [7] and women with diseases [8]. Depression [9], low self-efficacy [10], and sexual dysfunction [11] are among the reported factors that lower the quality of

life of middle-aged men. However, few studies have been conducted on the extent to which these major variables affect the quality of life of middle-aged men.

Depression is an emotional state in which an individual constantly feels sadness and insecurity due to its negative effect on how they think, feel, and behave [12]. In Europe, the rate of taking antidepressants is highest among those in their late 40s, and the rate of taking antidepressants among middle-aged people is higher than that of other age groups, which was reported to be 10% [13]. In Korea, the use of antidepressants increases from the age of 40, and in the case of men, those in their 50s take the most antidepressants [14]. In addition to experiencing depressive symptoms, the seriousness of middle-aged depression is demonstrated by the high proportion of middle-aged individuals who need pharmacological intervention. There is also a clear distinction between males and females: female identity is defined in the context of social relationships and communication, while for men, identity is defined by competitiveness and emotional isolation [15]. In other words, not only are men often inexperienced in resolving their own mental stress and psychological problems [16,17] but they also find it difficult to express their difficulties and

ask others for help, and may even consider it a waste of time [18]. Moreover, due to these differences in characteristics between women and men, it has been found that men received less psychological treatment than women, although they had high levels of stress and suffered psychologically and emotionally [19]. Depression is not just a Korean problem but a global problem, and it is a disease that affects mankind significantly: It is predicted to be a major cause of the global burden of disease [20].

Quality of life is a subjective evaluation by an individual. It comprises physical, psychological, and social interactions and is multidimensional [21]; therefore, quality of life has a broad meaning and is influenced by objective factors such as the subject's environment and living conditions, as well as subjective and personal factors [22]. Among the personal factors that affect quality of life, depression is the most representative, and when levels of depression are high, the quality of life is lowered [23]. Self-efficacy is among the factors that affect the quality of life: Higher self-efficacy leads to more desirable health behaviors and, consequently, quality of life increases [24].

Self-efficacy is the ability to solve problems in difficult situations [25]; therefore, it can help middle-aged men better deal with the psychological crises they may face. In particular, because it enables the management of negative emotions [26], middle-aged men's self-efficacy can be an important variable to help them overcome a midlife crisis. In addition, since people with high self-efficacy try to solve problems without avoiding them [27], it can facilitate middle-aged men to solve the problems they face, help them through this transitional period in their lives, and prepare them for aging.

Sexual function is a psychological and physiological response to sexual stimuli, meaning erectile ability, climax, sexual desire, sexual satisfaction, and overall satisfaction with one's sexual life [28]. After the age of 40, the testosterone produced by men's testes and adrenal glands decreases [29]. This decrease in the testosterone hormone causes characteristic symptoms such as decreased sexual interest and function, erectile dysfunction, and depression [30]. Erectile dysfunction, the most representative menopausal syndrome in middle-aged men, causes a decrease in sexual function and can lead to a feeling of a loss of value as a man, psychological frustration, and conflict with a spouse, in turn leading to a decrease in the quality of life [31,32]. Sexual function affects quality of life as it is related to various aspects such as personal psychological health, physical health, social relationships and functioning, and vitality of life [33,34]. Furthermore, as sexual function deteriorates, depression and anxiety increase, and self-esteem and quality of life decrease [34].

Middle age is an open period that can comprise positive or negative developments and strategies to encourage positive developments during this period are needed. In some ways, middle age can be an opportunity to recognize existing problems: If a program that can point middle-aged individuals in a healthy direction is provided, it can be a period of opportunity to convert to a healthy lifestyle. Therefore, it is necessary to confirm the degree to which depression, self-efficacy, and sexual function affect the quality of life of middle-aged men in Korea. This will allow the provision of basic data for programs and interventions that improve the quality of life of middle-aged Korean men by identifying the variables that affect it.

2. Methods

2.1 Study design

This study adopted a descriptive approach that aimed to determine the effects of depression, self-efficacy, and sexual function on the quality of life of middle-aged Korean men.

2.2 Participants

The study participants were middle-aged Korean men aged 41–64 years who gave written informed consent to participate in the study. The data collection period was October 23, 2020, to November 15, 2020. The number of required participants for the study was calculated using the G*Power software (version 3.1.9.7, Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany) based on the regression analysis, a sample size of at least 160 was required for a median effect size of 0.15, significance level of 0.05, power of 0.95, and eight variables. Data was collected using a questionnaire survey conducted with 250 people from three small and medium-sized enterprises, four government offices, university alumni associations, and meetings. A total of 216 people were included in the final analysis, excluding 34 who gave incomplete responses or responses.

2.3 Measures

2.3.1 General characteristics

General characteristics included mean age, education, religion, job, income, subjective health status, BMI, physical exercise, alcohol consumption, smoking, and current disease. Participants' educational levels were categorized as those with a high school diploma or lower and those with a college diploma or higher. Participants' religious status was categorized as religious or non-religious. Income was classified as 100–299 ten thousand won, 300–499 ten thousand won, and 500 ten thousand or more won per month. Subjective health status was categorized as either healthy or average. BMI was classified as 22.9 kg/m^2 or less, 23–24.9 kg/m^2, or 25 kg/m^2 over [35]. Physical exercise, alcohol consumption, smoking, and current disease were all categorized as yes or no.

2.3.2 Depression

Depression was measured using the Korean version of the Beck Depression Inventory (K-BDI), developed by Beck [36] to measure the cognitive and behavioral phenomena of depression. A total of 21 items captures the emotional, cognitive, behavioral, and physical symptom areas of depression. Each item is scored on a 4-point Likert scale consisting of 0–3 points; the possible score range is 0–63 points, and a higher score signals a higher degree of depression. In the present study, the Cronbach's α value was 0.90.

2.3.3 Self-efficacy

Self-efficacy was measured using the self-efficacy scale measurement tool developed by Sherer, Maddux, Jacobs, and Rogers [37] on a 5-point Likert scale of 23 items. The possible score range is 23–115, and a higher score means a higher degree of self-efficacy. In the present study, the Cronbach's α value was 0.92.

2.3.4 Sexual function

Sexual function was measured using the International Index of Erectile Function (IIEF) developed by Rosen *et al.* [20]. A total of 15 questions are divided into five areas covering erectile function, sexual satisfaction, climax, sexual desire, and overall satisfaction with sexual life. Questions 1–10 are rated on 6-point Likert scales of 0–5 points, while Questions 11–15 are scored on 5-point Likert scales of 1–5 points. The possible score range is 5–75 points, and a higher score means a higher degree of sexual function. In the present study, the Cronbach's α value was 0.97.

2.3.5 Quality of life

Quality of life was measured using the Korean version of the World Health Organization Quality of Life Simple Scale (WHOQOL-BREF), which is based on the World Health Organization Quality of Life Assessment Instrument (WHOQOL). With a total of 26 questions, this instrument is divided into four areas: physical aspects, psychological aspects, social aspects, and aspects of the living environment and overall quality of life. Each item is rated on a 5-point Likert scale, with a possible score range of 26–130, and with higher scores indicating a higher quality of life. In the present study, Cronbach's α was 0.94.

2.4 Data analysis

The collected data were analyzed using SPSS version 26 (IBM Corp., Armonk, NY, USA) General characteristics were analyzed in terms of means, standard deviations, frequency, and percentage. Differences in the participants' levels of depression, self-efficacy, sexual function, and quality of life according to their general characteristics were analyzed via *t*-test and ANOVA, and the Scheffe test was used as a post-hoc test. The relationship between depression, self-efficacy, sexual function, and quality of life was analyzed using Pearson's correlation coefficient, while the factors affecting quality of life were analyzed by hierarchical regression.

3. Results

3.1 General characteristics

Table 1 shows the participants' general characteristics. Their average age was 50.09 years. As for educational level, 175 had a college degree or higher, and 41 held a high school diploma or lower. There were 113 religious participants and 103 non-religious participants. Most of the participants were professional and office workers. 104 participants had a monthly household income of more than 300 ten thousand won to less than 500 ten thousand won, 87 had a monthly household income of more than 500 ten thousand won, and 25 had a monthly household income of more than 100 ten thousand won to less than 300 ten thousand won. 112 participants perceived their subjective health status as average, while 104 participants perceived themselves to be healthy. In terms of BMI, 100 participants were 25 kg/m^2 or more, 61 were 23–24.9 kg/m^2 or less, and 55 were less than 22.9 kg/m^2. of the participants did physical exercise, and 134 did not smoke, while 155 reported drinking alcohol. 173 participants were currently free from disease.

3.2 Differences in levels of depression, self-efficacy, sexual function, and quality of life according to general characteristics

Table 2 shows the differences in the participants' degree of depression according to their general characteristics. The participants' degrees of depression differed significantly according to their monthly income household (F = 4.26, p = 0.015) and subjective health status (t = –6.24, p < 0.001): higher monthly household income yielded a lower degree of depression, while participants who perceived themselves to be healthy also had lower levels of depression than those who perceived themselves to have an average level of health.

The participants' self-efficacy was significantly different according to their subjective health status (t = 4.15, p < 0.001) and level of physical exercise (t = 2.89, p = 0.004). Regarding subjective health status, participants who perceived themselves to be healthy had higher self-efficacy than those who perceived their health status as average, and participants who exercised regularly showed higher self-efficacy than those who did not exercise.

Levels of sexual function showed significant differences according to participants' monthly household income (F = 4.63, p = 0.011), subjective health status (t = 4.15, p < 0.001), physical exercise (t = 3.57, p = 0.001), and whether they smoked (t = –1.98, p = 0.049). For those participants who perceived their subjective health status as healthy, higher monthly household income was positively correlated with sexual function. This was not true for those who perceived their health status as average. The degree of sexual function was also higher among non-smokers than smokers.

Table 1. General characteristics and depression, self-efficacy, sexual function, quality of life (N = 216).

Characteristics	Categories	N	%	$M \pm SD$
Age		216	100	50.09 ± 6.29
Education	≤High school	41	19	
	≥Graduate school	175	81	
Religion	Yes	113	52.3	
	No	103	47.7	
Job	Professional, office workers	146	67.6	
	Service, self-employment, blue-collar workers	70	32.4	
Income (10,000 won)	100–299	25	11.6	
	300–499	104	48.1	
	≥500	87	40.3	
Subjective health status	Healthy	104	48.1	
	Average	112	51.9	
BMI (kg/m^2)	≤22.9	55	25.5	
	23 24.9	61	28.2	24.82 ± 2.44
	≥25	100	46.3	
Physical exercise	Yes	160	74.1	
	No	56	25.9	
Alcohol drinking	Yes	155	71.8	
	No	61	28.2	
Smoking	Yes	82	38	
	No	134	62	
Current disease	Yes	43	19.9	
	No	173	80.1	
Depression				9.83 ± 7.40
Self-efficacy				80.67 ± 12.36
Sexual function				50.01 ± 17.79
Quality of life				92.06 ± 13.07

Quality of life was determined according to the general characteristics of occupation (t = 2.77, p = 0.006), household monthly income (F = 6.06, p = 0.003), subjective health status (t = 6.94, $p < 0.001$), and physical exercise (t = 2.49, p = 0.014). There was a significant difference between non-drinkers of alcohol and drinkers (t = 2.12, p = 0.036). Moreover, participants working in professional and office jobs had a higher quality of life than those working in service and production jobs or who were self-employed, and monthly household income was positively correlated with quality of life. As for subjective health status, participants who perceived themselves to be healthy had a higher quality of life than those who perceived their health status as average. Finally, the quality of life of participants who exercised regularly and drank alcohol was higher than those who did not exercise and did not drink alcohol.

3.3 Correlations between depression, self-efficacy, sexual function, and quality of life

Table 3 shows the relationship between depression, self-efficacy, sexual function, and quality of life. There was a negative correlation between quality of life and depression (r = –0.51, $p < 0.001$), while self-efficacy (r = 0.52, $p < 0.001$) and sexual function (r = 0.35, $p < 0.001$) showed a positive correlation. That is, higher quality of life led to lower levels of depression and higher self-efficacy and sexual function.

Depression had a significant negative correlation with self-efficacy (r = –0.31, $p < 0.001$) and sexual function (r = –0.30, $p < 0.001$); that is, participants with higher levels of depression had lower degrees of self-efficacy and sexual function. Self-efficacy was positively correlated with sexual function (r = 0.27, $p < 0.001$); in other words, those with higher self-efficacy had higher degrees of sexual function as well.

3.4 Factors affecting quality of life

Table 4 shows the factors affecting the participants' quality of life. Hierarchical multiple regression analysis was performed to confirm the explanatory power of these factors. As a result of testing the regression formula, the Durbin-Watson statistic was 1.667, thus indicating there was no issue with autocorrelation. The tolerance limit values ranged from 0.310 to 0.955, that is, all above were 0.1, and the Variance Inflation Factor (VIF) value was less than 10 from 1.040 to 3.224, confirming that there was no problem with multicollinearity.

Table 2. Differences in depression, self-efficacy, sexual function, and quality of life according to general characteristics (N = 216).

Variables	Categories	Depression M ± SD	Depression p / scheffe	Self-efficacy M ± SD	Self-efficacy p / scheffe	Sexual function M ± SD	Sexual function p / scheffe	Quality of Life M ± SD	Quality of Life p / scheffe
Education level	≤High school	10.00 ± 8.89	0.870*	78.80 ± 12.59	0.285*	48.02 ± 16.45	0.428*	89.85 ± 14.73	0.230*
	≥Graduate school	9.79 ± 7.04		81.10 ± 12.30		50.48 ± 18.10		92.58 ± 12.64	
Religion	Yes	10.01 ± 7.93	0.709*	79.91 ± 12.92	0.348*	49.06 ± 17.40	0.411*	91.16 ± 12.80	0.287*
	No	9.63 ± 6.81		81.50 ± 11.73		51.06 ± 18.24		93.06 ± 13.35	
Job	Professional, office Workers	9.25 ± 6.81	0.123*	81.44 ± 12.53	0.186*	51.55 ± 17.97	0.066*	93.75 ± 12.41	0.006*
	Service, self-employment, blue-collar workers	11.04 ± 8.44		79.06 ± 11.93		46.80 ± 17.09		88.56 ± 13.79	
Income (10,000 won)	100–299[a]	13.68 ± 10.26	0.015** b, c<a	76.48 ± 12.26	0.064**	40.40 ± 20.32	0.011** a<b, c	84.88 ± 13.54	0.003** a<b, c
	300–499[b]	9.71 ± 7.15		79.99 ± 13.27		50.29 ± 17.30		91.50 ± 12.64	
	≥500[c]	8.86 ± 6.41		82.68 ± 10.94		52.45 ± 16.87		94.80 ± 12.71	
Subjective health status	Healthy	6.87 ± 4.92	<0.001*	84.17 ± 12.50	<0.001*	55.04 ± 15.11	<0.001*	97.87 ± 12.17	<0.001*
	Average	12.58 ± 8.23		77.41 ± 11.35		45.35 ± 18.85		86.68 ± 11.51	
BMI (kg/m^2)	≤22.9	9.85 ± 7.20	0.758**	79.04 ± 10.35	0.389**	48.60 ± 19.71	0.374**	90.64 ± 13.87	0.493**
	23 24.9	10.38 ± 8.37		80.25 ± 14.58		52.70 ± 14.35		93.52 ± 12.80	
	≥25	9.48 ± 6.92		81.82 ± 11.90		49.15 ± 18.56		91.96 ± 12.81	
Physical exercise	Yes	9.45 ± 7.06	0.204*	82.08 ± 12.21	0.004*	52.71 ± 16.35	0.001*	93.36 ± 12.69	0.014*
	No	10.91 ± 8.28		76.63 ± 11.99		42.30 ± 19.56		88.38 ± 13.54	
Alcohol drinking	Yes	9.38 ± 7.32	0.157*	81.39 ± 12.18	0.173*	50.99 ± 17.08	0.198*	93.12 ± 13.76	0.036*
	No	10.97 ± 7.56		78.84 ± 12.74		47.52 ± 19.41		89.38 ± 10.76	
Smoking	Yes	10.26 ± 7.62	0.508*	82.20 ± 12.30	0.156*	46.98 ± 19.23	0.049*	92.13 ± 13.56	0.952*
	No	9.57 ± 7.28		79.73 ± 12.35		51.87 ± 16.65		92.01 ± 12.81	
Current disease	Yes	10.81 ± 7.56	0.331*	80.44 ± 11.49	0.894*	50.35 ± 16.98	0.891*	89.53 ± 12.42	0.156*
	No	9.58 ± 7.37		80.72 ± 12.60		49.93 ± 18.03		92.69 ± 13.18	

*; t-test, **; ANOVA.

Table 3. Correlation of depression, self-efficacy, sexual function, and quality of life (N = 216).

Variables	Depression	Self-efficacy	Sexual function	Quality of life
	r (p)	r (p)	r (p)	r (p)
Depression	1			
Self-efficacy	−0.31 (<0.001)	1		
Sexual function	−0.30 (<0.001)	0.27 (<0.001)	1	
Quality of life	−0.51 (<0.001)	0.52 (<0.001)	0.35 (<0.001)	1

Table 4. Influencing factors of quality of life (N = 216).

Variables		MODEL1		MODEL2	
		β	p	β	p
Job (Service, self-employment, blue collar)	Professional, office workers	0.003	0.613	0.052	0.354
Monthly income (100–299)	300–499	0.199	0.054	0.064	0.469
	≥500	0.289	0.007	0.111	0.229
Subjective health (average)	Healthy	0.389	<0.001	0.183	0.002
Physical exercise (no)	Yes	0.082	0.192	0.005	0.921
Alcohol drinking (no)	Yes	0.074	0.234	0.035	0.508
Depression				−0.281	<0.001
Self-efficacy				0.331	<0.001
Sexual function				0.102	0.075
F(p)/R^2/Adjusted R^2		10.86 (p < 0.001)/0.238/0.216		19.49 (p < 0.001)/0.460/0.436	

To identify the factors affecting the participants' quality of life, in Model 1, occupation, household income, subjective health status, exercise, and drinking alcohol, all of which had a significant impact on quality of life, were entered. In Model 2, depression, self-efficacy, and sexual function were also entered. The nominal variables were converted into dummy variables and analyzed.

In Model 1, the factors that significantly affected the quality of life were monthly household income and subjective health status, and the explanatory power was 21.6% (F = 10.86, $p < 0.001$). Participants who had a monthly household income of more than 500 ten thousand won ($\beta = 0.289$, $p = 0.007$) reported a higher quality of life than those with a monthly household income of 100 to 299 ten thousand won. The quality of life of participants who perceived their subjective health as healthy was also found to be higher than those who perceived their subjective health to be average ($\beta = 0.389$, $p < 0.001$).

In Model 2, in which depression, self-efficacy, and sexual function were added, the factors that had a significant effect on quality of life were subjective health status, depression, and self-efficacy, and the explanatory power increased to 43.6% (F = 19.49, $p < 0.001$). As self-efficacy ($\beta = 0.331$, $p < 0.001$) increased, the quality of life also increased, and as depression ($\beta = -0.281$, $p < 0.001$) increased, the quality of life decreased. The quality of life ($\beta = 0.183$, $p = 0.002$) of participants who perceived their subjective health to be healthy was higher than that of those who perceived their subjective health as average.

4. Discussion

This study investigated the relationship between depression, self-efficacy, sexual function, and quality of life. Its findings show the effect of different variables on the quality of life of 216 middle-aged Korean men. The results illustrate that middle-aged men's monthly household income is negatively correlated with depression. This is the same result as a previous study, which found that higher incomes reduced financial stress and lowered depression [38]. A study on Korean adults also reported that high income had a strong negative correlation with depression [39]. These findings are significant not only because economic status is an important factor in quality of life, but also because middle-aged Korean men are primarily responsible for their households' income; therefore, if they are unable to engage in economic activities such as retirement, the psychological pain for them may be greater than that of women in similar situations [40]. Therefore, of the examined factors, income was found to have largest impact on the emotional and psychological state of middle-aged men.

In the case of subjective health status, the subjects who perceived their health to be average reported higher levels of depression than those who perceived themselves as healthy. This supports the results of one previous study that found that poor self-assessment of one's own health (i.e., low subjective health) increased depression levels and that in the case of subjects with diseases, depression was the most important link [41]. However, in this study, only whether the participants suffered from a disease or not was included in the analysis, and no significant variables for depression, self-efficacy, or sexual function were included.

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Therefore, it is necessary to classify diseases in the future or to investigate the degree of dysfunction caused by certain diseases to derive expanded research results.

The present study also revealed that the middle-aged men's economic levels were positively correlated with their sexual function. This result is consistent with previous studies that have found that income is a factor that influences erectile dysfunction in men [42]. In addition, it confirms the results of studies that have shown that people who do not have a job have lower levels of erectile function than those who have a high income and are in employment [43]. Similar results were also observed in previous studies of women [44], that is, when income is high, sexual activity is higher, indicating that the sexual function of both men and women is affected by income or economic status. Therefore, in treatment and nursing interventions for subjects with sexual dysfunction, it is necessary to assess their economic status, regardless of their gender.

In previous research [45], when a 12-week exercise program was implemented for prostate cancer patients, those who exercised had significantly higher sexual desire than those who did not, which is consistent with the results of the present study. It is thought that exercise acted as a factor that had a positive effect on sexual life; therefore, exercise programs and interventions are needed to increase sexual function as a way to, in turn, increase sexual desire and satisfaction among middle-aged men. Non-smokers were found to have higher levels of sexual function than smokers. These results are consistent with those of previous studies that have demonstrated that smoking lowers sexual function and more than doubles the risk of moderate to severe erectile dysfunction [46]. Therefore, to improve sexual function among middle-aged men, it is necessary to systematically provide them with smoking cessation education. However, it should be noted that in the present study, only the binary distinction between smokers and non-smokers was confirmed.

Drinking alcohol was also confirmed as one of the factors affecting middle-aged men's quality of life: The drinkers in the present study had a higher quality of life than the non-drinkers. This result is partially consistent with those of previous research showing that moderate drinkers have a higher quality of life [47]. However, given the meta-analysis finding that frequent heavy drinking can lower quality of life [48], it can be seen that the amount and frequency of drinking are also important variables. Alcohol consumption, in any amount, reduces wellbeing [49] and quality of life. However, participants in the present study only answered "Yes" or "No" when asked whether they drank alcohol, rather than describing their drinking levels as heavy, moderate, or light. This is a limitation. Consequently, it is necessary to further explore the extent of how middle-aged men's drinking levels impact their quality of life.

Examining the relationship between participants' levels of depression, self-efficacy, sexual function, and quality of life showed that quality of life had a statistically significant positive correlation with self-efficacy and sexual function, and self-efficacy was positively correlated with sexual function. Depression showed a statistically significant negative correlation with quality of life, and self-efficacy and sexual function showed a negative correlation with depression. Sexual function is related to various individual aspects, such as individual psychological and physical health, social relationships and functioning, and vitality of life, and affects the quality of their lives [33,34]. Therefore, it is necessary to develop sexual counseling and education programs to improve middle-aged men's quality of life.

This study's hierarchical regression analysis to identify the factors affecting the participants' quality of life showed that subjective health status, depression levels, and self-efficacy were all significant variables. These variables had an overall explanatory power of 43.6% for the participants' quality of life. The variable that had the most influence on quality of life was self-efficacy ($\beta = 0.331$, $p < 0.001$). These results are partially consistent with another hierarchical regression analysis of factors affecting the quality of life of men and women in their 40s and above in rural areas ($\beta = 0.14$, $p = 0.040$) [50]. People with a high sense of self-efficacy demonstrate high levels of motivation and confidence in their work and actively try to solve problems as their right to self-determination increases. Therefore, to improve middle-aged men's quality of life, it is necessary to develop intervention programs that can help enhance their self-efficacy.

Depression levels ($\beta = -0.281$, $p < 0.001$) were also found to be a variable that had a significant effect on quality of life, which is consistent with the results reported by a previous study by Demirtaş and Temircan (B = –0.45, $p = 0.01$) [43]. However, the present study surveyed middle-aged men regardless of whether they had testicular cancer, while the research of Demirtaş and Temircan focused only on male patients with testicular cancer; therefore, a simple comparison may be difficult. The present study was concerned with all middle-aged men, including patients with cancer. Also, when it is judged that the same results were obtained for male cancer patients, it is expected that there will be areas of intervention program to be provided within the context of all men. However, future research should attempt to confirm our results by analyzing the cases of middle-aged men both with and without male cancer. This study's results highlight the need to identify areas of intervention programs that can be provided for all subjects and those that should be provided separately for each subject.

Although this study has the advantage of approaching the physical, psychological, and cognitive factors that impact men's major health problems, it has some limitations. First, the study's data were not representative data that can be generalized to all middle-aged men in Korea. More-

over, as a cross-sectional study, it was difficult to identify changes over time and the cause-and-effect relationship. Therefore, it is necessary to further confirm this causal relationship through longitudinal studies in the future and to facilitate the generalization of the results through repeated studies using more widely representative data.

5. Conclusions

Middle-aged men's quality of life can be affected by psychological, cognitive, and physical variables. In particular, quality of life increases as self-efficacy increases and decreases as depression increases. Therefore, the quality of life of middle-aged men should be improved by increasing self-efficacy and decreasing depression, which is its main influencing factors. Controlling these variables during the age crisis experienced by middle-aged men is significant because it is linked not only to their quality of life but also to their future health as older men. Many studies have identified the factors affecting elderly women's quality of life and aimed to improve it. However, unlike women, men are relatively unaccustomed to asking for help from others; therefore, they may miss the appropriate time to receive appropriate treatment and support. Therefore, in establishing an intervention strategy to improve the quality of life of middle-aged men, influencing factors should be considered.

Author contributions

These should be presented as follows: SJR and MJK designed the research study. SJR and MJK performed the research. SJR and MJK and SAK provided help and advice on detail. SJR analyzed the data. SJR and MJK and SAK wrote the manuscript. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate

This study was conducted after receiving approval (1040647-201912-HR-004-01) from the Institutional Review Board (IRB) of Daejeon University for the ethical protection of research participants. Before data collection, the researchers met the participants and explained the contents and purpose of the study, and data were collected after obtaining consent forms. All participants who participated in this study wrote a handwritten signature in the consent form.

Conflict of interest

The authors declare no conflict of interest.

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