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The Relations Among Physical Indicators, Cognitive Status, Community Participation, and Depression of the Frail Male Elderly in Taiwan

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Abstract

This study explored the basic attributes, physiological indices, cognitive states, and community participation of older male outpatients with frailty for predicting depression. Questionnaires were collected using purposive sampling from a medical clinic in a teaching hospital in northern Taiwan. One hundred and ninety frail men enrolled as participants. The results revealed that older male adults with frailty, the age, residence, income, self-reported health status, alcohol consumption, total instrumental activities of daily living (IADL) scores in physiological indices, IADL grouping, cognitive state score, each Mini-Mental State Examination category, and involvement and dedication scores exhibited statistical differences from depression scores. Depression determinants, such as an excellent and normal self-reported health status and IADL total score, could predict the depression status of male older adults with frailty. Nursing personnel should assess the self-reported health status and self-care ability of male older adults with frailty early to prevent or delay geriatric depression.

Keywords

frailty, male, physiological index, cognitive state, community participation, depression status

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In 2018, the number of Taiwanese older adults aged 65 or older reached 3.43 million, accounting for 14.5% of the total population of Taiwan (Ministry of the Interior Department of Statistics of Taiwan, 2019). Although aging is an unavoidable biological process, the greatest joy for older adults is to be able to live independently and take care of themselves with self-confidence and dignity. Frailty is conceptually different from aging, disability, and comorbidity, even though it is clearly related to these factors. The proportion of frailty increases as people age. The symptoms of frailty, as defined in most literature, include weight loss, muscle weakness, slow walking speed, exhaustion, and low levels of physical activity (Chang & Lin, 2015; Fried et al., 2001). According to Fried et al. (2001), the proportions of patients with geriatric frailty in the 65–70, 75–79, and >85 age groups were approximately 3.2, 10, and 26%–44%, respectively. In Taiwan, Hsu et al. (2017) conducted a Healthy Aging Longitudinal Study with random sampling using the five indicators of Fried frailty to evaluate frailty. They found that the elderly with frail or prefrail account for 46.9%. This indicates that frailty is a critical concern for the older adult population (Lohman et al., 2015).

Frailty is a geriatric syndrome combined with multiple factors and may be accompanied by pain, imbalance, limb

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weakness, and poor endurance. These factors may cause disability or dependence in physical function, thereby generating depression (Fugate Woods et al., 2005). Frailty tends to cause older adults to have early onset of a fatal disease and die younger than expected. Evidence has shown that frailty may become one of the most serious health problems worldwide, and degenerative diseases have higher mortality rates than do infectious diseases among the same age group (Dent et al., 2016). Relevant studies have indicated that women have a higher prevalence of frailty than do men (Dent et al., 2016; Mello et al., 2014). A systematic literature review and meta-analysis conducted by Chang and Lin (2015) demonstrated that men with frailty had a higher mortality rate than did women with frailty. Men should pay more attention to frailty prevention and its effect on their health.

A meta-analysis performed by Soysal et al. (2017) revealed that 10% of older adults aged over 55 years have depression and frailty simultaneously, and those with frailty have an increased chance of developing depression. Having both frailty and depression often leads to increased use of medical services, increased morbidity and mortality rates, and a decline in the quality of life of older adults. Relevant studies on frailty and depression status have identified that geriatric depression is related to disability, frailty, and mortality. Depression is a high-risk factor for suicide, and in particular, suicide caused by geriatric depression is extremely difficult to prevent and treat; thus, screening for geriatric depression is an essential part of preventing and treating frailty (Lakey et al., 2012).

Relevant evidence studies on frailty have mostly targeted community-dwelling older adults and excluded older outpatients because the attributes are relatively different (Chang et al., 2018, 2019). Therefore, the elderly in outpatient clinics need more attention than community-dwelling older adults. This study investigated the correlation between the physiological indices, cognitive state, community participation, and depression status of male older outpatients with frailty, with the aim of obtaining a deeper understanding and providing a reference for the formulation of future care plans and health policy.

Aims

This study explored the basic attributes, physiological indices, cognitive state, community participation, and predictive depression status in male older outpatients with frailty.

Methods

Research Design

This study adopted a cross-sectional research design. Samples were recruited using purposive sampling in an internal medicine clinic of a teaching hospital in northern Taiwan.

Research Participants

The inclusion criteria were as follows: (1) conscious men aged older than 65 years, (2) able to communicate in Chinese or Taiwanese, (3) must agree to participate in this study and be able to fill in the questionnaire by himself or with the assistance of graduate students or caregivers, (4) male older outpatients in the internal medicine clinic, and (5) determined as frail according to the Study of Osteoporotic Fracture (SOF) index. The exclusion criteria were as follows: (1) severe visual impairment, hearing difficulties, and unable to cooperate with the investigator; (2) severe intellectual impairment, mental, or cognitive impairments, and not able to understand or follow the instructions; and (3) patients with acute injuries or fractures that require plaster, which affects upper and lower limb activity.

Number of Samples

This study used the total number of variables as the basis for calculating the number of samples, which was 25 in total. The power was set to 0.8 and the G-power software package was used for estimations, which revealed that the significance level was $\alpha = 0.05$, and the number of people was 172. Considering the loss of samples and incorrectly filled questionnaires possibly affecting the response rate, this study added an extra 10% to the number of research participants, and thus 190 participants were recruited.

Research Ethics

This study was reviewed and approved by the Institutional Review Board from MacKay Memorial Hospital (Project number: 18MMHIS085e). The consent of physicians was obtained during sample recruitment, where male older adults who met the inclusion criteria were selected and recruited. Before collecting data, the researcher personally explained the objective of the study as well as the research methods and procedures to the male older outpatients. The participants were required to fill in a consent form to participate in the study.

Research Instrument

Basic Attributes. Basic attributes included age, educational level, religion, self-reported health status, income, previous work nature, living status, marital status, types of medication taken, smoking or drinking history, type of chronic illness, sleep condition, and fall history.

Frailty Assessment. The SOF Criteria for Frailty were used to assess frailty. A scale proposed by Ensrud et al. (2008) that has three indicators: (1) unintentional weight loss of more than 3 kg or 5% in the past year, (2) the ability to stand up five times from sitting in a chair without using an armrest, and (3) whether the person feels energetic. For scoring, patients who meet two or more of the abovementioned indicators are categorized as frail, patients who meet one indicator are categorized as prefrail, and those who meet none of the indicators are categorized as nonfrail.

Luciani et al. (2010) conducted a sensitivity, specificity, and accuracy study of the SOF index on 419 older adults aged over 70 years, and their results revealed the reliability, sensitivity, specificity, and accuracy to be 0.81, 89.0%, 81.1%, and 86.5%, respectively. Ensrud et al. (2008) performed a screening and comparison of the SOF index and Cardiovascular Health Study index, revealing that the SOF index could predict frailty satisfactorily.

Mental State Examination. This study used the Geriatric Depression Scale-Short Form 15 (GDS-SF15), which was simplified by Sheikh and Yesavage in 1986 on the basis of the original Geriatric Depression Scale (GDS-30) from 1982 (Sheikh et al., 1986). It comprises a 15-item scale and is mainly used to screen for depression in older adults. Less than 10 points severed mild to moderate depression and more than 10 points presented depression.

The original internal consistency reliability of the GDS-SF15, measured using Cronbach's α coefficient, was 0.72 (Sheikh et al., 1986). Later, Liao et al. (1995) converted the GDS-SF15 into a Chinese version, which had a Cronbach's alpha coefficient of 0.89 and sensitivity and specificity of 93.3% and 92.3%, respectively, which confirmed that the scale has favorable reliability and validity.

Instrumental Activities of Daily Living Scale. The instrumental activities of daily living (IADL) scale was divided into eight items. The IADL scale is not necessary for basic functions but enables individuals to live independently in their community. The scoring method for each item is dichotomous scoring (i.e., 1 or 0 points with a maximum of 8 points). Lawton and Brody (1969) proposed this scale to assess the ability of community-dwelling older adults to perform complex activities in the past month. The reliability among 15 testers was 0.85, and the test–retest reliability was 0.96 in 97 men and 0.93 in 168 women. For the diagnosis of dementia (cut-off point score > 0), the sensitivity was 0.94 and the specificity was 0.71. These indicated satisfactory reliability and validity.

Grip Strength. A grip strength test is a representative and simple muscle-strength testing method that assesses upper limb muscle strength to observe whether older adults have sufficient strength to perform daily activities.

Rikli and Jones (1999) studied the nationwide basic attributes of community-dwelling older adults. Total grip strength was defined as the sum of the grip of both the left and right hands; the measurement unit was kilogram with one decimal point; and the Intraclass Correlation Coefficient value of the test was 0.81. In addition, Bohannon and Schaubert (2005) tested the test–retest reliability of both hands and did not identify significant differences—the left-hand score was 0.954 and the right-hand score was 0.912.

30-Second Chair Stand Test. This test was used to measure the strength of older adults' lower limb muscles by observing their ability to shift their posture from sitting to standing in 30 seconds.

According to Rikli and Jones (1999), a nationwide basic data study of community-dwelling older adults in the United States reported a correlation coefficient of 0.71–0.78 and test–retest reliability of 0.86–0.92.

Mini-Mental State Examination. The Chinese version of the MMSE was translated by Guo et al. (1988), and the assessment lasts approximately 5–10 minutes. The scale contains 11 questions, and one point is given for each correct answer. The maximum score is 30 points, and a higher score indicates higher cognitive function. A score $\geq$24 points indicates normal cognitive function, whereas a score $\leq$9 points indicates severe cognitive dysfunction; scores of 10–18 points indicate moderate cognitive dysfunction, and scores of 19–23 points indicate mild cognitive dysfunction. The MMSE is widely adopted because of its easy, time-saving, and quantitative characteristics that help in communication between medical personnel (Folstein et al., 1975).

Folstein et al. (1975) tested the MMSE scale on psychiatric patients in senior centers and retirement homes. A total of 206 older adults participated in the test, and the sensitivity and specificity of the MMSE scale were demonstrated to be 0.85 and 0.82, respectively. Regarding the Chinese version of the MMSE translated by Guo et al. (1988), a tool reliability study was conducted on 441 normal adults aged over 30 years with different educational levels. The reliability was 0.89 and the consistency among the participants was 0.83 (Guo et al., 1989).

Community Participation Scale. This study adopted the community participation scale proposed by Wu (1999), who studied the community participation motivation, participation level, and life adaptation of older adults in eastern Taiwan. The scale has 16 questions in total, and

the answering method is a 4-point ordinal scale. Scores are calculated from 1 to 4 points. The item of community participation scale is ordinal by a Likert 4-point scale. We averaged all of the items in the analysis and the score is assumed to be scaled. The higher score indicated a higher level of community participation by the respondent.

Wu (1999) collected 1,239 cases of older adults aged over 65 years in eastern Taiwan and used the "Questionnaire on the community participation and living adaptation of older adults" as a research instrument. The sensitivity and specificity of the scale were demonstrated to be 0.81 and 0.87, respectively. The community participation scale was used for predictive reliability analysis, and the Cronbach's α value was 0.67, where individually the values for attendance, involvement, control, and dedication were 0.78, 0.77, 0.89, and 0.57, respectively.

Results

Descriptive Analysis of Basic Attributes, Physiological Indices, IADL, and the MMSE

Tables 1 and 2 demonstrated the descriptive analysis of basic attributes, physiological indices, IADL, and the MMSE.

Differences and Correlation of Basic Attributes, Physiological Indices, Cognitive State, and Community Participation with Depression Status

According to Tables 3 and 4, age, living status, income, self-reported health status, and alcohol consumption attained significant levels ($p < .05$), indicating that these basic attributes of the male older outpatients with frailty had a clear correlation with depression. A further comparison revealed that the older the individual was, the higher his level of depression. Depression levels were higher in the older adults who lived in nursing homes compared with those who lived with their families; those who required income subsidies were more depressed than those with sufficient income; those with poor self-reported health were more depressed than normal people or those with excellent and normal self-reported health statuses; and those who did not consume alcohol were more depressed than those who consumed alcohol.

The IADL total score and grouping in physiological indices reached a significant level ($p < .05$), indicating that a clear correlation existed between the physiological indices and depression in the male older outpatients with frailty. A higher IADL score (lower disability score) signified that the participants had a lower degree of geriatric depression. Those with a disability had higher levels of depression compared with normal

Table 1. Descriptive Analysis of Basic Attributes of the Male Older Outpatients With Frailty ($n = 190$) (Category Variable).

Category	No. of people	Percentage (%)
Age (years)		
65–74	73	38.4
75–84	66	34.7
Above 85	51	26.8
Educational level		
Illiterate	24	12.6
Elementary school	90	47.4
Junior high school	21	11.1
Senior high school	34	17.9
University or above	21	11.1
Previous occupation		
Military	10	5.3
Civil servant	15	7.9
Teacher	9	4.7
Manufacturing	41	21.6
Business	27	14.2
Service	32	16.8
Agriculture	48	25.3
Others	8	4.2
Marital status		
Unmarried	4	2.1
Married	151	79.5
Cohabitating	2	1.1
Divorced	12	6.3
Widowed	21	11.1
Living status		
With family	156	82.1
Solitary	13	6.8
Nursing home	21	11.1
Income		
On subsidy	48	25.3
Sufficient	142	74.7
Religion		
None	70	36.8
Buddhist	40	21.1
Taoist	38	20.0
Christian	9	4.7
Folk religion	32	16.8
Others	1	0.5
Self-reported health status		
Excellent	27	14.2
Poor	50	26.3
Normal	113	59.5
Types of medication taken		
1–3 types	41	21.6
4–6 types	111	58.4
More than 7 types	38	20.0
Smoking history		
No	86	45.3
Yes	104	54.7

(continued)

Table 1. (continued)

Category	No. of people	Percentage (%)
Alcohol consumption		
No	145	76.3
Yes	45	23.7
Sleeping condition		
Normal	137	72.1
Light sleep	32	16.8
Insomnia	21	11.1
Chronic disease history		
No	48	25.3
Yes	142	74.7
Fall history		
No	164	86.3
Yes	26	13.7
Age (mean = 78.38, *SD* = 9.28) (years)		
65–74	73	38.4
75–84	66	34.7
85 and above	51	26.8
Educational level		
Illiterate	24	12.6
Elementary	90	47.4
Junior high school	21	11.1
Middle high school	34	17.9
University and above	21	11.1
Occupation		
Military	10	5.3
Civil servant	15	7.9
Teacher	9	4.7
Manufacturing	41	21.6
Businessman	27	14.2
Service	32	16.8
Agriculture	48	25.3
Others	8	4.2
Marital status		
Unmarried	4	2.1
Married	151	79.5
Cohabitating	2	1.1
Divorced	12	6.3
Widowed	21	11.1
Living status		
With family	156	82.1
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Nursing home	21	11.1
Income		
On subsidy	48	25.3
Sufficient	142	74.7
Religion		
None	70	36.8
Buddhist	40	21.1
Taoist	38	20.0
Christian	9	4.7
Folk religion	32	16.8
Others	1	0.5

(continued)

Table 1. (continued)

Category	No. of people	Percentage (%)
Self-reported health status		
Excellent	27	14.2
Poor	50	26.3
Normal	113	59.5
Types of medication taken		
1–3 types	41	21.6
4–6 types	111	58.4
More than 7 types	38	20.0
Smoking history		
No	86	45.3
Yes	104	54.7
Alcohol consumption		
No	145	76.3
Yes	45	23.7
Sleeping condition		
Normal	137	72.1
Light sleep	32	16.8
Insomnia	21	11.1
Chronic disease history		
No	48	25.3
Yes	142	74.7
Fall history		
No	164	86.3
Yes	26	13.7

Note: Data collection in this study was performed between December 2018 and May 2019 at the outpatient clinic of the case hospital.

people. Other physiological indices did not exhibit any significant relationships. The cognitive state score and grouping reached significant levels ($p < .05$), where the male older outpatients with frailty had a lower depression level when they had a higher cognitive state score. In the community participation scale, only the correlation coefficients of involvement ($r = -.14$, $p < .05$) and dedication ($r = -.14$, $p < .05$) achieved significantly negative values. Moreover, the community participation grouping reached a significant level ($p < .05$), where the depression levels of male older adults with frailty who had low community participation were higher than those of older adults with high community participation (Tables 5 and 6).

Major Predictors of Depression in Male Older Outpatients With Frailty

With a force entry of all the possible predictors which were significant in the previous univariate analyses, the multiple regression model showed that the overall F-test reached a significant level ($F = 5.40$, $p < .001$) and the explanatory power ($R^2 = 0.285$) was statistically significant, effectively explaining 28.5% of geriatric depression.

Table 2. Descriptive Statistics of Physiological Indices, IADL, the MMSE, Community Participation, and the GDS-SF15 ($n = 190$) (Continuous Variable).

	Mean	*SD*
Physiological indices		
Height	164.52	6.06
Weight	64.49	12.74
BMI	23.76	4.14
Normal (18.5 kg/m^2–24 kg/m^2)	21.61	1.52
Underweight <18.5 kg/m^2	17.19	1.10
Overweight >24 kg/m^2	27.43	3.28
Left hand muscle strength	23.25	5.98
Right hand muscle strength	23.91	6.40
Average muscle strength of both hands	23.61	6.12
Number of complete sets in the 30-s chair stand test	3.67	3.03
WBC	13,423	5,734
CRP	8.64	7.98
AC sugar	158.08	63.12
Disability level (IADL)		
No	7.24	0.77
Yes	2.15	1.91
Cognitive level (MMSE)		
>25 points, normal cognition	26.32	1.25
21–24 points, mild cognitive impairment	22.72	0.98
10–20 points, moderate cognitive impairment	16.24	2.85
<9 points, severe cognitive impairment	7.29	2.75
Community participation level		
Attendance	2.41	1.27
Involvement	2.97	1.19
Control	0.87	1.08
Dedication	1.54	1.19
GDS-SF15	3.79	2.642

Note: Data collection in this study was performed between December 2018 and May 2019 at the outpatient clinic of the case hospital.
AC sugar = blood *sugar* before meals; BMI = body mass index; CRP = C-reactive protein; GDS-SF15 = Geriatric Depression Scale-Short Form 15; IADL = instrumental activities of daily living; WBC = white blood cell; MMSE = mini-mental state examination.

According to the results of the variance inflation factor, such values of all variables were between 1.07 and 3.11 (i.e., all were <10), indicating that no severe collinearity problem existed between the independent variables, and subsequent regression results could be solved (Chiou, 2010). The *t*-test results revealed that in terms of self-reported health status, the regression coefficients of "excellent versus Poor" ($\beta = -0.26$, $p < .01$) and "normal versus Poor" ($\beta = -0.35$, $p < .001$) reached significantly negative values; moreover, the regression coefficient of the IADL total score achieved a significantly negative value ($\beta = -0.39$, $p < .001$) (see Table 7).

Discussion

Descriptive Analysis and Correlation Between the Basic Attributes, Physiological Indices, Cognitive State, Community Participation, and Depression Status of the Male Older Outpatients With Frailty

The participants exhibited higher values of mean white blood cell (WBC) count, mean C-reactive protein (CRP), and blood sugar before meals compared with normal ranges. This finding is consistent with previous studies. According to the meta-analysis conducted by Soysal et al. (2017) and research by Barzilay et al. (2007), older adults with frailty tend to have a relatively high WBC concentration in blood. A meta-analysis by Lindqvist (2009) indicated that the CRP level in patients with depression is higher than that in healthy individuals. Fried and Haslbeck (2019) discovered that frail older adults with poor blood sugar control are susceptible to depression. Similarly, Chiu and Du (2019) reported that a high score on a depression test indicates poor blood sugar control. Regarding the correlation between alcohol consumption and depression, the present study confirmed that frail older adults who consumed alcoholic drinks were less likely to experience depression compared with those who did not; this finding corresponds with that of relevant studies. The possible reason is that the use of alcohol can make the elderly temporarily transfer from depression. Collard investigated whether alcohol consumption in frail older adults is a predictor of depression with 3-year, 6-year, and 9-year follow-ups, and the results

Table 3. Difference Between Basic Attributes in the Participants With Frailty ($n = 190$) (Category Variable).

Variable	No. of people	$M \pm SD$	t/F	p	Ex-post comparison
63–74 years	73	3.41 ± 2.39	1.70	.186	
75–84 years	66	3.82 ± 2.87			
85 years and above	54	4.29 ± 2.66			
Illiterate	24	4.17 ± 3.62	0.45	.770	
Elementary school	90	3.54 ± 2.20			
Junior high school	21	4.05 ± 3.04			
Senior high school	34	4.06 ± 3.17			
University and above	21	3.71 ± 1.71			
Previous occupation[b]			0.50	.837	
Marital status[b]			1.42	.228	
Living status[b]					
With family	156	3.56 ± 2.47	5.36**	.005	3>1
Solitary	13	3.77 ± 2.28			
Nursing home	21	5.52 ± 3.47			
Income[a]					
Subsidy	48	4.60 ± 3.35	2.09*	.040	
Sufficient	142	3.51 ± 2.31			
Religion[b]			0.36	.872	
Self-reported health status [b]					
Excellent	27	2.74 ± 1.48	15.10***	<.001	2>1, 3
Poor	50	5.40 ± 3.09			
Normal	113	3.33 ± 2.34			
Types of medication taken[b]			1.06	.350	
Smoking history[a]					
No	86	3.77 ± 2.68	−010	.917	
Yes	104	3.81 ± 2.63			
Alcohol consumption[a]					
No	145	3.99 ± 2.89	2.65**	.009	
Yes	45	3.13 ± 1.47			
Sleep state[b]					
Normal	137	3.81 ± 2.88	0.26	.775	
Light sleep	32	3.53 ± 1.83			
Insomnia	21	4.05 ± 2.01			
Chronic disease history[a]					
No	48	3.75 ± 2.54	−012	.905	
Yes	142	3.80 ± 2.68			
Hypertension[a]					
No	70	3.63 ± 2.21	−064	.523	
Yes	120	3.88 ± 2.87			
Diabetes[a]					
No	120	3.93 ± 2.85	0.98	.327	
Yes	70	3.54 ± 2.24			
Cancer[a]					
No	160	3.78 ± 2.65	−010	.921	
Yes	30	3.83 ± 2.64			
Fall history[a]					
No	164	3.77 ± 2.74	−028	.782	
Yes	26	3.92 ± 1.92			

Note: Data collection in this study was performed between December 2018 and May 2019 at the outpatient clinic of the case hospital. Descriptive statistics for each group are presented as mean ± *SD*.

[a]Independent sample *t*-test.

[b]One-way analysis of variance.

*$p < .05$, **$p < .01$, ***$p < .001$.

Table 4. Correlation of Basic Attributes, Physiological Indices, Cognitive State, and Community Participation With Geriatric Depression ($n = 190$) (Continuous Variable).

Physiological indices	*r*	*p*
Age	0.16*	.025
Height	0.03	.671
Weight	0.02	.754
BMI index	0.01	.880
Left hand muscle strength	−0.04	.604
Right hand muscle strength	−0.01	.856
Average muscle strength of both hands	−0.03	.730
Number of completed sets in the 30-s chair stand test	−0.07	.309
IADL total score	−0.33***	<.001
WBC	0.04	.754
CRP	0.01	.911
AC sugar	−0.07	.429
Cognitive state score	−0.23**	.001
Community participation score	−0.30**	.02

Note: Data collection in this study was performed between December 2018 and May 2019 at the outpatient clinic of the case hospital.
AC sugar = blood *sugar* before meals; BMI = body mass index; CRP = C-reactive protein; IADL = instrumental activities of daily living; WBC = white blood cells.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 5. Difference of Physiological Indices, Cognitive State, and Community Participation With Geriatric Depression ($n = 190$) (Category Variable).

Physiological indices		No. of people	$M \pm SD$	*F*/*t*	*p*
BMI grouping[b]	Normal (18.5–24)	95	3.64 ± 2.19	0.30	.743
	Underweight <18.5	14	4.00 ± 3.51		
	Overweight >24	81	3.93 ± 2.97		
IADL grouping[a]	Without disability	86	3.06 ± 2.04	−3.70***	<.001
	With disability	104	4.39 ± 2.93		
Cognitive level grouping[b]	≤10 points being mild to moderate depression	140	3.61 ± 2.80	4.26**	.006
	>10 points being severe depression	50	2.67 ± 1.55		
Community participation level grouping[a]	Low	169	3.95 ± 2.74	4.62***	<.001
	High	21	2.52 ± 1.03		

Note: Data collection in this study was performed between December 2018 and May 2019 at the outpatient clinic of the case hospital.
[a]Independent sample *t*-test.
[b]One-way analysis of variance.
[c]Pearson correlation.
BMI = body mass index; IADL = instrumental activities of daily living.
*$p < .05$, **$p < .01$, ***$p < .001$.

revealed that individuals who consumed alcohol less frequently had a relatively high risk of developing depression (Collard et al., 2015).

This study identified that geriatric depression levels were higher for male older outpatients with increased age, which matched the depression-related factors in relevant studies (Chen et al., 2015; Yang, 2019). Hsu et al. (2013) investigated the correlation between age and depression status in a veteran's home and reported that the average age was 80.9 (±5.4) years, and the overall functional status was 92.8% independent. The average depression scale score for all participants was 2.0 (±2.3) points; the prevalence rate of geriatric depression (the behavioral characterization of nine major indicators of depression) was 8.4%; and older veterans experienced a higher level of depression. Ho et al. (2016) collected the data of 2,444 older adults aged over 65 years in southern Taiwan. The study was performed using correlation and regression analyses with independent variables, including sex, age, educational level, status of low-income

Table 6. Correlation of Physiological Indices, Cognitive State, and Community Participation with Geriatric Depression ($n = 190$) (Continuous Variable).

Physiological indices	*r*	*p*
Height[c]	0.03	.671
Weight[c]	0.02	.754
BMI index[c]	0.01	.880
Left hand muscle strength[c]	−0.04	.604
Right hand muscle strength[c]	−0.01	.856
Average muscle strength of both hands[c]	−0.03	.730
Number of completed sets in the 30-s chair stand test [c]	−0.07	.309
IADL total score[c]	−0.33***	<.001
WBC[c]	0.04	.754
CRP[c]	0.01	.911
AC sugar[c]	−0.07	.429
Cognitive state score[c]	−0.23**	.001
Community participation score[c]	−0.10	.162

Note: Data collection in this study was performed between December 2018 and May 2019 at the outpatient clinic of the case hospital.
[a]Independent sample *t*-test.
[b]One-way analysis of variance.
[c]Pearson correlation.
AC sugar = blood *sugar* before meals; BMI = body mass index; CRP = C-reactive protein; IADL = instrumental activities of daily living; WBC = white blood cells.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 7. Regression Analysis for Predicting the Depressive State of Male Older Outpatients With Frailty ($n = 190$).

Independent variable	*B*	*SE*	β	*t*	*p*	VIF
Constant	10.17	2.97		3.42***	.001	
Age	−0.05	0.03	−0.18	−1.74	.083	2.52
Living status						
With family versus nursing home	−0.71	0.65	−0.10	−1.10	.271	2.10
Solitary versus nursing home	−0.48	0.91	−0.05	−0.52	.604	1.82
Income (Subsidy vs. sufficient)	−0.48	0.49	−0.08	−0.97	.331	1.54
Self-reported health status						
Excellent versus poor	−1.96	0.65	−0.26	−3.01**	.003	1.76
Normal versus poor	−1.86	0.45	−0.35	−4.09***	<.001	1.70
Alcohol consumption (no vs. yes)	0.75	0.42	0.12	1.81	.072	1.07
IADL total score	−0.35	0.10	−.39	−3.39***	.001	3.11
MMSE total score	0.01	0.05	.01	0.15	.878	2.12
Community participation level (low vs. high)	0.65	0.57	.08	1.14	.256	1.09
R^2	0.246					
F	5.83***					
p	<.001					

Note: Data collection in this study was performed between December 2018 and May 2019 at the outpatient clinic of the case hospital;
B = unstandardized regression coefficient; β = the standardized regression coefficient; IADL = instrumental activities of daily living; MMSE, mini-mental state examination; VIF = variance inflation faction.
*$p < .05$, **$p < .01$, ***$p < .001$.

households, self-reported health status, whether they had a disability card, and ADL and IADL scores; the GDS-SF15 score was the dependent variable. The results demonstrated that age was significant.

The present study observed that people who lived in nursing homes had higher depression levels than those who lived with their families. Lin et al. (2004) revealed that approximately 29.5% of community-dwelling older adults had depression, and the prevalence of depression in nursing homes was 39.2%. The depression status in nursing homes was significantly higher than that in the community, which was similar to the results of the

present study. Ku (2014) reported that low income was a related risk factor for geriatric depression. A study in Taiwan on the correlation between religion, life satisfaction, and depression in middle-aged and older adults revealed that age, education level, economic status, community activities, and self-reported health status had significant relationships with depression (Wang & Chang, 2018).

The male older outpatients with poorer self-reported health status were more depressed than those who had excellent and normal self-reported health statuses. Ku (2014) stated that poor self-reported health status is a risk factor for depression in older adults, and Lai (2017) agreed that self-reported health status has a significant correlation with depression. Furthermore, Chang and Chueh (2011) suggested that the incidence of depression was 10.2 times higher in older adults with self-reported chronic diseases that affect their daily lives ($p < .001$, 95% CI [3.6, 29.3]).

Regarding the association between the community participation and depression status of older adults, only the correlation coefficients between involvement and dedication in the community participation scale had significant negative values with depression status, demonstrating that male older outpatients tended to have a lower level of depression when they are highly involved in and dedicated to community activities. Community participation grouping achieved statistically significant levels, signifying that it has a clear correlation with geriatric depression. A comparison showed that the depression levels of male older outpatients with low-level community participation were higher than those of high-level participants. Other related studies such as Shih et al. (2005), Lin et al. (2010), and Lu et al. (2015) have reported that a reduction in social activity participation will increase older adults' depression levels. A lack of participation in social activities is a relevant risk factor for geriatric depression (Ku, 2014). Tien and Chiou (2013) demonstrated that older age is associated with lower levels of social participation, whereas higher educational levels (high school), satisfactory self-care function, and not living in a nursing home were associated with higher levels of social participation. All achieved statistical significance, and thus a more severe depression status can lead to lower social participation levels. Tseng (2015) demonstrated that older adults with depression participated in significantly fewer social activities and lower levels of social participation than those without depression. Statistically significant differences indicated that people with lower social participation exhibited higher levels of depression. In addition, Chang (2010) discovered that significant factors related to geriatric depression included marital status, self-reported health status, physical difficulty, work status, and social activity participation. The findings of this study were similar to these aforementioned relevant studies, where social participation was related to geriatric depression.

Exploration of the Basic Attributes, Physiological Indices, Cognitive State, Community Participation, and Depression Status Predictability of the Male Older Outpatients With Frailty

In terms of self-reported health status, the regression coefficients of "excellent versus Poor" and "normal versus Poor" were significantly negative, signifying that male older outpatients with excellent and normal self-reported health statuses had lower levels of depression. Similar to the study of Ho et al. (2016), a regression analysis of self-reported health statuses achieved significant explanatory power ($R^2 = 0.33$), in which IADL scores were significant, followed by self-reported health statuses. Ho et al. (2016) revealed that all sociodemographic variables and functional test variables significantly related to total GDS-SF15 scores and self-reported health statuses held considerable explanatory power.

The regression coefficient of IADL total scores had a significantly negative value, demonstrating that male older outpatients with a higher IADL total score (lower disability level) tended to have lower levels of depression. The regression coefficients did not reach significant levels for other independent variables. Ho et al. (2016) reported similar results in that IADL scores and depression statuses had significant explanatory power. Lin (2010) used secondary data analysis to collect data from 2007 to 2009 of 43,103 people aged over 50 years who received community household visits. The results indicated that cognitive dysfunction and depression were crucial predictors of reduced daily life function.

Limitations

This study adopted a cross-sectional study design with purposive sampling, and inferences were restricted because only the data of male older outpatients with frailty at a medical center in Taipei were collected. Meanwhile, there was not a process for controlling for the variance of variables, when we added variables to the regression model. Therefore, the predictability and inference of research may be affected. Nevertheless, this study was the first to explore the correlations between basic attributes, physiological indices, cognitive state, community participation, and depression status in Taiwanese male older outpatients with frailty. The aim was for the findings to become a vital basis for nursing personnel in caring for male older adults with frailty.

Conclusions

This study identified that the physiological indices, cognitive state, and community participation correlated with depression for the male older outpatients with frailty. Particularly, self-reported health status and IADL should be emphasized because they can predict the depression status of frail men.

Nursing Implications

This study had confirmed that physiological indices, cognitive state, and community participation in older frail male adults strongly correlated with depression. Nursing personnel must preemptively assess the self-perceived health status and self-care ability of male older adults with frailty to detect their disabilities in advance and thereby prevent or delay their depression.

Clinical Resources

- National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention: http://www.cdc.gov/chronicdisease/
- World Health Organization: http://www.who.int/mediacentre/factsheets/fs404/en/

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