



Moderation of Marital and Occupational Status on the Effect of Personality Trait on 1 Year Suicidality of Middle-Aged Adults

Gihwan Byeon¹, Jee Eun Park^{2,3}, Jin Pyo Hong^{4,5}, Maeng Je Cho³, and Jong-Ik Park^{1,6} ✉

¹Department of Neuropsychiatry, Kangwon National University Hospital, Chuncheon, Republic of Korea

²Department of Neuropsychiatry, Seoul National University Hospital, Seoul, Republic of Korea

³Department of Psychiatry, Seoul National University College of Medicine, Seoul, Republic of Korea

⁴Department of Psychiatry, Samsung Medical Center, Seoul, Republic of Korea

⁵Department of Psychiatry, Sungkyunkwan University School of Medicine, Seoul, Republic of Korea

⁶Department of Psychiatry, Kangwon National University College of Medicine, Chuncheon, Republic of Korea

Objective This study aimed to examine how marital status, occupational status, and individual personality influence suicidal ideation and suicide attempts among Korean middle-aged adults, and explore the effects of their interaction.

Methods A total of 2,464 middle-aged adults were surveyed about suicidality in the past year (1-year suicidality). Participants' current marital and occupational status, including other demographic and clinical variables were investigated. Personality traits were assessed using the Big Five Inventory. The dependent variable was the presence of 1-year suicidality. Independent variables were current marital and occupational status. Generalized linear model (GLM) analysis was performed to adjust for other covariates.

Results The group with 1-year suicidality had significantly lower income. It had a lower proportion of full-time employment, and higher percentages of part-time employment and unemployment. The GLM analysis results showed that marital and occupational status had no significant association with 1-year suicidality. Neuroticism and openness were positively associated with 1-year suicidality, whereas conscientiousness and extraversion had a negative association. Interactions between marital status and neuroticism, conscientiousness, and occupational status were significant.

Conclusion Individualized social and psychological interventions for suicide prevention are required according to individual personality traits.

Psychiatry Investig 2023;20(4):341-349

Keywords Suicide; Middle aged; Personality; Marital status; Occupational status.

INTRODUCTION

Suicide is a problematic social phenomenon globally, and the incidence rate is steadily increasing.^{1,2} It not only claims the lives of individuals, but also emotionally traumatizes the family members of those who complete suicide³ and causes significant social loss nationally.^{4,5} The severity of the suicide problem has created a new perspective which considers suicide to be an independent mental health problem or disease status, rather than simply an outcome of mental illness, such

as depression, as reflected in the existing view.^{6,7} Middle-aged adults are an economically active group,⁸ and suicidality in this age group can have an especially devastating effect. Therefore, identification of factors affecting suicidality in this age group is considered important for prevention.

Marital and occupational status are also known to be associated with suicide. Some studies found high suicide risks among divorced, widowed, never married, or cohabiting individuals compared to currently married individuals.⁹⁻¹¹ Contrarily, others reported lower suicide rates among widowed and divorced individuals, compared to married persons.^{12,13}

Furthermore, previous ecological research indicated that the national rate of male suicides correlated with the unemployment rate.^{14,15} Moreover, job insecurity was also shown to trigger depression and suicidal ideation.^{16,17} However, other studies have contradicted these findings.^{18,19} In a study conducted in Korea, manual workers experienced more suicidal ideation than non-manual workers. Therefore, it appears that

Received: September 24, 2022 **Revised:** December 13, 2022

Accepted: January 23, 2023

✉ **Correspondence:** Jong-Ik Park, MD, PhD

Department of Neuropsychiatry, Kangwon National University Hospital, 156 Baengnyeong-ro, Chuncheon 24289, Republic of Korea

Tel: +82-33-258-2152, **Fax:** +82-33-258-2027, **E-mail:** lugar@kangwon.ac.kr

© This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

not only the status of employment, but also the quality of and satisfaction with the job are related to suicidal ideation.²⁰ These results suggest that marital and occupational status may act as risk factors for suicide; however, other factors may also mediate or interact with this association, such as personality. In the meantime, marital and occupational status are data that can be investigated relatively easily at the national level, and confirming their influence on suicide, either independently or in interaction with other factors, could help establish overall measures for suicide prevention.

Personality has been examined in various studies using several measurement tools. The widely used Five-Factor Model (FFM) quantifies personality characteristics in five dimensions: openness, conscientiousness, extraversion, agreeableness, and neuroticism.²¹ Openness means “friendly/compassionate vs. critical/rational,” conscientiousness is “efficient/organized vs. extravagant/careless,” extraversion is “outgoing/energetic vs. solitary/reserved,” agreeableness is “friendly/compassionate vs. critical/rational,” and neuroticism is “sensitive/nervous vs. resilient/confident.”²² These five personality factors are known to represent basic dimensions of human personality in various languages and cultures.²³⁻²⁶ Also, the FFM has strong predictive validity,^{27,28} interrater agreement,²⁹ and heritability.³⁰ The relationship between the FFM personality traits and suicide has been well-researched in various prior studies. High neuroticism is consistently reported to be related to suicide.³¹⁻³³ Extraversion and conscientiousness have yielded controversial results.³⁴⁻³⁶ Some studies suggested that openness may be associated with increased suicidal ideation.^{37,38} However, in most studies, agreeableness was not associated with suicide.^{39,40} These inconsistent results may indicate the possibility of interaction or mediation by other risk factors in the relationship between personality and suicide. For example, social support or isolation could play an important role in this relationship.

As suggested above, marital status, occupational status, personality, and sex directly or indirectly affect suicidality, and a complex interaction between each factor is thought to exist. This interaction can be explained through the “diathesis-stressor model.” According to this model, suicidality is the result of an interaction between an acute negative condition (stressor) and the corresponding vulnerability trait (the diathesis).⁴¹ In this study, occupational status and marital status were considered stressors, with personality and sex considered the diatheses, and the effect of their interaction on suicidality was explored.

Hence, the present study aimed to investigate how marital status, occupational status, and personality influence suicidal ideation and behaviors among a group of middle-aged Korean people. The findings may help establish an intervention model

by identifying the independent and interacting influences in this relationship.

METHODS

Data collection and participants

The data used in this study were taken from the 2011 Korean Epidemiologic Catchment Area (KECA) study, which is a nationally representative survey. The KECA evaluated the prevalence of major psychiatric disorders using the structured interview manual based on the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV).^{42,43} The participants were selected from the 2010 population census data using a stratified, multi-stage, and clustered sampling design. The household residents aged between 18 and 74 years, excluding institutionalized individuals, were chosen. For representative sample extraction, a total of 246 sampling units were selected from 61 subdivisions extracted from 12 catchment areas. Out of a total of 14,204 households, at least one household was nominated from each sampling unit, and one individual per household was randomly selected. After eliminating those who did not meet the study criteria or refused to participate, 6,022 participants were included.⁴² Among them, 2,464 males and females between the ages of 40 to 59 years who had responded to the questionnaire about suicidality in the past year were included in this study. All procedures of the study protocol were approved by the Institutional Review Board of Seoul National University College of Medicine (IRB No. C-1104-092-359). All participants were fully informed of the study objectives and written informed consent was obtained from them before their participation. Furthermore, all methods were carried out in adherence to relevant guidelines and regulations. The dataset is available upon reasonable request to the corresponding author.

Measures

One-year suicidality

This study used the Korean version of the Composite International Diagnostic Interview (K-CIDI), which is a popular structured diagnostic tool used worldwide.^{44,45} We used the K-CIDI module on suicide to assess lifetime suicidality. Lifetime suicidal ideation was assessed using the item, “Have you ever seriously thought of committing suicide?” A lifetime suicide plan was examined with the item, “Have you ever concretely planned a suicide?” Lifetime suicide attempts were assessed with the item, “Have you ever attempted suicide?” Moreover, the number of suicide attempts was recorded. Suicidality was defined as either suicidal ideation, planning, or attempts. The participants were also asked about their age at the time of the

first and last suicidal ideation, planning, and attempt. In this way, we defined whether participants had “1-year suicidality” over the past year.

Big Five Inventory-11

Personality was assessed using the 11-item version of the Big Five Inventory (BFI-11), with two items for each personality domain, except agreeableness, which has three. Each item is scored on a 5-point Likert scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”), following the statement “I see myself as someone who...”. Items for extraversion are numbered 1R (“...is reserved”) and 6 (“...is outgoing, sociable”). Agreeableness items are numbered 2 (“...is generally trusting”), 7R (“...tends to find fault with others”), and 11 (“...is understanding and kind to almost everyone”). Conscientiousness items are numbered 3R (“...tends to be lazy”) and 8 (“...does a thorough job”). Neuroticism items are numbered 4R (“...is relaxed, handles stress well”) and 9 (“...gets nervous easily”). Finally, openness items are numbered 5R (“...has few artistic interests”) and 10 (“...has an active imagination”). Here, the initial “R” indicates that the item is reverse scored.^{46,47} The score for each personality domain was the sum of the points for each item, or, in the case of reverse-scored items, the score was calculated by subtracting six from the point of each personality factor item.

Marital status and occupational status

To evaluate marital status, a questionnaire was administered to determine whether participants were currently married, widowed, separated, divorced, or had never been married. In the subsequent analysis, to ascertain the importance of maintaining a stable marriage, the marital status category was divided into two categories: “maintaining (currently married)” or “not maintaining (widowed, separated, divorced, or had never been married).” Occupational status was categorized into full-time, part-time, and unemployed. This category was applied in the subsequent analysis.

Physical illness

To evaluate the participants’ physical condition, a medical history of diabetes or hyperglycemia, hypertension, hyperlipidemia, stroke, heart disease, and cancer was evaluated. According to the methods of a previous study, if any of the six diseases were present, physical illness was coded “1” (positive). However, cases with no disease history were coded as “0” (negative).⁴⁸

One-year major depressive episode

Major depressive disorder is known to significantly increase the risk of suicide⁴⁹ and significantly affect marital failure⁵⁰

and unemployment.⁵¹ Therefore, major depressive disorder could be a significant confounding factor in this study. Hence, major depressive disorder was added as a covariate among major psychiatric disorders investigated in this 2011 KECA study. The presence of “at least one major depressive episode in the past year” was investigated using a structured interview based on DSM-IV.⁴⁵

Other covariates

Self-reported data on demographic characteristics, including age, sex, residential area, years of education, and monthly income, were surveyed in this study. Age was recorded in units of years and subsequently used for analysis as a continuous variable. Other covariates were categorized. Education level was classified into groups including “not formally educated,” “below elementary school,” “below high school,” and “high school and above.” Monthly income was classified as “less than 2 million won,” “more than 2 million won and less than 3 million won,” and “more than 3 million won.” The residential area was classified as “rural” or “urban.”

Data analysis

Statistical analysis was conducted using IBM SPSS Statistics for Windows, version 24.0 (IBM Corp., Armonk, NY, USA). The significance level was based on a two-tailed p-value of 0.05. First, differences in demographic and clinical variables were compared between the groups with and without 1-year suicidality. The t-test was used for continuous variables and the Pearson Chi-square test was used for categorical variables.

Next, a generalized linear model (GLM) analysis was performed, correcting for all the covariates together (age, education, income, region, chronic illness, and 1-year major depressive episode). The five personality traits and marital status (reference: maintaining) and occupational status (reference: full-time) were the independent variables. The dependent variable was 1-year suicidality. Thereafter, interaction terms between independent variables were added to analytic models to investigate the interaction effects. Among the personality traits, variables that had significant association ($p < 0.10$) on initial GLM were selected. Personality \times marital status (occupational status), and marital status (occupational status) \times sex were assessed for a two-way interaction effect. Furthermore, stratified subgroup analysis was performed on variables whose interaction was significant in the GLM analysis to confirm the interaction effect.

RESULTS

Characteristics of the study sample

Of the 2,464 participants, 96 had a history of suicidality in

the past year (1-year suicidality). Suicidal ideas or plans accounted for 3.9% (96/2,464) of the total, whereas suicide attempts represented only 0.3% (9/2,464). Moreover, everyone who attempted suicide had suicidal ideas or plans. There were no significant differences in age, sex, residential area, chronic illness, and marital status in the groups with and without 1-year suicidality. However, participants with 1-year suicidality had lower levels of education, income, and full-time employment, and higher levels of part-time employment and unemployment. The proportion of participants with a major depressive episode was larger in the group with 1-year suicidality (Table 1).

In the five personality domains, neuroticism was significantly higher in the group with 1-year suicidality, and conscientiousness and extraversion were significantly lower. No significant difference was found between openness and agreeableness (Table 1).

Effects of marital status, occupational status, and personality on 1-year suicidality

Marital status was divided into two categories: “maintaining (currently married)” or “not maintaining (widowed, separated, divorced, or had never been married).” Results of GLM analysis, in which each independent variable of interest was added with a covariate (age, sex, education, region, income, chronic illness, and major depressive episode), revealed that marital status (not maintaining: odd ratio [OR]=1.131, 95% confidence interval [CI]=0.644–1.988) and occupational status (part-time: OR=1.874, 95% CI=0.952–3.689; unemployed: OR=1.007, 95% CI=0.531–1.910) were not significantly associated with 1-year suicidality (Table 2). Among the personality domains, a positive association was significant for neuroticism (OR=1.199, 95% CI=1.057–1.360) and openness (OR=1.145, 95% CI=1.004–1.307). A negative association was significant for extraversion (OR=0.840, 95% CI=0.748–0.944); conscientiousness was statistically not significant but showed a trend for significance (OR=0.882, 95% CI=0.773–1.007). Agreeableness was not significantly associated (OR=0.938, 95% CI=0.846–1.039); therefore, it was excluded from subsequent analyses (Table 2).

Interaction effect of marital status, occupational status, personality, and sex on 1-year suicidality

The results indicated that marital status (not maintaining: OR=1.181, 95% CI=0.408–3.419) and occupational status (part-time: OR=0.602, 95% CI=0.157–2.298; unemployed: OR=1.970, 95% CI=0.556–6.979) had no significant interaction effects with sex on 1-year suicidality (Table 3). However, neuroticism had a significant interaction with marital status (not maintaining: OR=1.346, 95% CI=1.002–1.808) (Table 4).

Table 1. Demographic and clinical characteristics stratified 1-year suicidality

Variables	1-year non-suicidal (N=2,368)	1-year suicidal† (N=96)	p
Age (yr)	48.70±5.59	49.68±5.38	0.095
Sex			0.152
Female	1,180 (49.8)	55 (57.3)	
Male	1,188 (50.2)	41 (42.7)	
Education year			0.021
0 yr	20 (0.8)	2 (2.1)	
1–6 yr	189 (8.0)	14 (14.6)	
7–9 yr	345 (14.6)	19 (19.8)	
10–12 yr	1,067 (45.1)	42 (43.8)	
>12 yr	747 (31.5)	19 (19.8)	
Region			0.087
Rural	472 (19.9)	26 (27.1)	
Urban	1,896 (80.1)	70 (72.9)	
Income			<0.001
<2 million won	695 (34.5)	49 (57.6)	
2–3 million won	521 (25.9)	18 (21.2)	
≥3 million won	796 (39.6)	18 (21.2)	
Chronic illness*			0.900
Present	619 (27.0)	24(26.4)	
Absent	1,676 (73.0)	67(73.6)	
1-year major depressive episode			<0.001
Present	60 (2.5)	25 (26.0)	
Absent	2,308 (97.5)	71 (74.0)	
Marital status			0.117
Married	1,883 (79.6)	68 (70.8)	
Widowed/separated/divorced	335 (14.2)	19 (19.8)	
Unmarried	149 (6.3)	9 (9.4)	
Occupational status			0.006
Full-time	1,787 (75.8)	59 (61.5)	
Part-time	202 (8.6)	14 (14.6)	
Unemployed	367 (15.6)	23 (24.0)	
Neuroticism score‡	5.49±1.85	6.38±1.98	<0.001
Conscientiousness score‡	7.55±1.74	7.10±1.92	0.014
Extraversion score‡	6.05±2.06	5.28±2.05	<0.001
Openness score‡	6.39±1.78	6.70±1.75	0.088
Agreeableness score§	10.67±2.20	10.46±2.39	0.364

Values are presented mean±standard deviation or number (%). *if one of six diseases (diabetes, hyperglycemia, hypertension, hyperlipidemia, stroke or stroke, heart disease, and cancer history) exist, physical illness was coded 1 (positive). Contrarily, if there was no disease history, it was coded as 0 (negative); †1-year suicidality: the participants were also asked their age at the time of the last suicidal ideation, planning, and attempt we defined if participants have “1-year suicidality” for last 1 year; ‡range (2–10); §range (3–15)

Conscientiousness had a significant interaction with occupational status (part-time: OR=1.122, 95% CI=0.788–1.598; unemployed: OR=1.534, 95% CI=1.074–2.193) (Table 5) Nei-

Table 2. Independent effect of marital status, occupational status, and personality on 1-year suicidality

Independent variables	aOR (95% CI)*	p
Marital status		
Maintaining [†]	Reference	
Not maintaining [‡]	1.131 (0.644–1.988)	0.644
Occupational status		
Full-time	Reference	
Part-time	1.874 (0.952–3.689)	0.069
Unemployed	1.007 (0.531–1.910)	0.983
Neuroticism score	1.199 (1.057–1.360)	0.005
Extraversion score	0.840 (0.748–0.944)	0.003
Openness score	1.145 (1.004–1.307)	0.044
Agreeableness score	0.938 (0.846–1.039)	0.220
Conscientiousness score	0.882 (0.773–1.007)	0.063

*these results are all from the same regression model (adjusted: age, sex, education, region, income, chronic illness, and major depressive episode); [†]maintaining: currently married; [‡]not maintaining: widowed, separated, divorced, or had never been married

Table 3. Two-way interaction effect marital status occupational status, and sex on 1-year suicidality

Independent variables	aOR (95% CI)*	p
Marital status		
Maintaining	Reference	
Not maintaining	1.027 (0.443–2.380)	0.950
Sex		
Female	Reference	
Male	1.110 (0.628–1.964)	0.719
Marital status×sex		
Maintaining×sex	Reference	
Not maintaining×sex	1.181 (0.408–3.419)	0.759
Occupational status		
Full-time	Reference	
Part-time	2.462 (0.929–6.528)	0.070
Unemployed	0.693 (0.238–1.863)	0.467
Sex		
Female	Reference	
Male	1.071 (0.581–1.975)	0.827
Occupational status×sex		
Full-time×sex	Reference	
Part-time×sex	0.602 (0.157–2.298)	0.457
Unemployed×sex	1.970 (0.556–6.979)	0.294

*adjusted: age, education, region, income, chronic illness, and major depressive episode

ther extraversion (Table 6) nor openness (Table 7) had a significant interaction with other variables. Subsequently, subgroup analyses of neuroticism×marital status, and conscientiousness×occupational status were performed. Neuroticism was

Table 4. Two-way Interaction effect of marital status, occupational status, neuroticism, and sex on 1-year suicidality

Independent variables	aOR (95% CI)*	p
Marital status		
Maintaining	Reference	
Not maintaining	0.169 (0.022–1.280)	0.085
Neuroticism	1.110 (0.960–1.284)	0.160
Marital status×neuroticism		
Maintaining×neuroticism	Reference	
Not maintaining×neuroticism	1.346 (1.002–1.808)	0.049
Occupational status		
Full-time	Reference	
Part-time	0.226 (0.014–3.727)	0.298
Unemployed	4.113 (0.651–25.984)	0.133
Neuroticism	1.209 (1.033–1.415)	0.018
Occupational status×neuroticism		
Full-time×neuroticism	Reference	
Part-time×neuroticism	1.370 (0.924–2.031)	0.117
Unemployed×neuroticism	0.785 (0.579–1.064)	0.118

*adjusted: age, education, region, income, chronic illness, and major depressive episode

Table 5. Two-way interaction effect of marital status, occupational status, conscientiousness, and sex on 1-year suicidality

Independent variables	aOR (95% CI)*	p
Marital status		
Maintaining	Reference	
Not maintaining	0.605 (0.067–5.426)	0.653
Conscientiousness	0.862 (0.738–1.006)	0.060
Marital status×conscientiousness		
Maintaining×conscientiousness	Reference	
Not maintaining×conscientiousness	1.089 (0.812–1.460)	0.569
Occupational status		
Full-time	Reference	
Part-time	0.846 (0.060–11.932)	0.902
Unemployed	0.042 (0.003–0.680)	0.026
Conscientiousness	0.797 (0.676–0.940)	0.007
Occupational status×conscientiousness		
Full-time×conscientiousness	Reference	
Part-time×conscientiousness	1.122 (0.788–1.598)	0.524
Unemployed×conscientiousness	1.534 (1.074–2.193)	0.019

*adjusted: age, education, region, income, chronic illness, and major depressive episode

found to be more closely associated with 1-year suicidality in the “not maintaining” group (OR=1.547, 95% CI=1.197–1.999), but not in the “maintaining” group (OR=1.093, 95% CI=0.941–1.269). Furthermore, conscientiousness was negatively associated with 1-year suicidality in participants with full-time employment (OR=0.784, 95% CI=0.666–0.924). However, no significant association was found between part-time employment (OR=0.798, 95% CI=0.534–1.192) and unemployment (OR=1.371, 95% CI=0.950–1.979) (Figure 1).

Table 6. Two-way interaction effect of marital status, occupational status, extraversion, and sex on 1-year suicidality

Independent variables	aOR (95% CI)*	p
Marital status		
Maintaining	Reference	
Not maintaining	1.499 (0.354–6.355)	0.583
Extraversion	0.855 (0.745–0.981)	0.026
Marital status×extraversion		
Maintaining×extraversion	Reference	
Not maintaining×extraversion	0.942 (0.729–1.218)	0.651
Occupational status		
Full-time	Reference	
Part-time	4.654 (0.746–29.029)	0.100
Unemployed	0.432 (0.079–2.372)	0.334
Extraversion	0.835 (0.721–0.968)	0.016
Occupational status×extraversion		
Full-time×extraversion	Reference	
Part-time×extraversion	0.842 (0.600–1.179)	0.316
Unemployed×extraversion	1.168 (0.880–1.550)	0.282

*adjusted: age, education, region, income, chronic illness, and major depressive episode

DISCUSSION

This study aimed to determine how marital status, occupational status, and personality traits impact suicidality. The results of this study showed two main findings. First, the personality domains of neuroticism, extraversion, openness, and conscientiousness were significantly associated with 1-year suicidality, both in models with various confounders and in the multivariate model including social, marital, and occupational status. Second, marital and occupational status did not solely affect suicidality, and interacted with personality domains as well. The findings that neuroticism is positively as-

Table 7. Two-way interaction effect of marital status, occupational status, openness, and sex on 1-year suicidality

Independent variables	aOR (95% CI)*	p
Marital status		
Maintaining	Reference	
Not maintaining	1.307 (0.167–10.43)	0.799
Openness	1.153 (0.987–1.347)	0.073
Marital status×openness		
Maintaining×openness	Reference	
Not maintaining×openness	0.972 (0.727–1.299)	0.847
Occupational status		
Full-time	Reference	
Part-time	1.219 (0.075–19.695)	0.889
Unemployed	0.204 (0.013–3.125)	0.253
Openness	1.092 (0.933–1.278)	0.274
Occupational status×openness		
Full-time×openness	Reference	
Part-time×openness	1.064 (0.720–1.575)	0.755
Unemployed×openness	1.260 (0.864–1.837)	0.229

*adjusted: age, education, region, income, chronic illness, and major depressive episode

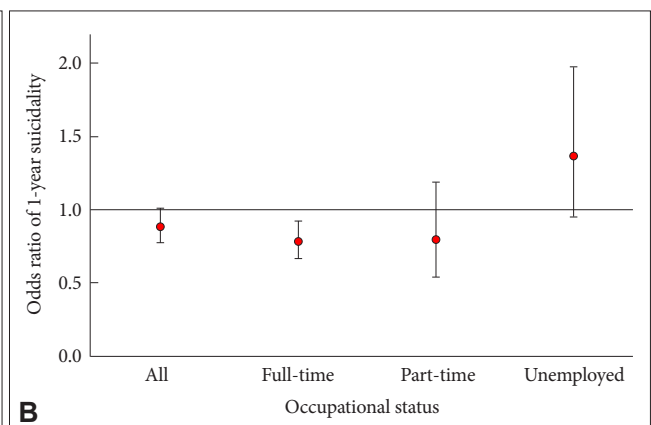
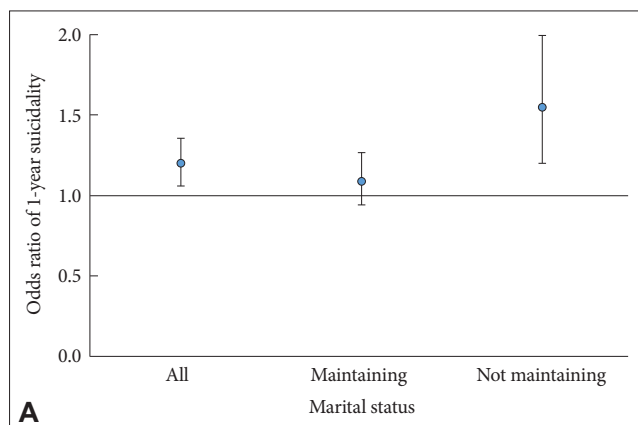


Figure 1. Subgroup analysis stratified by marital, occupational status, and sex. A: Association between neuroticism and suicidality stratified by marital status. B: Association between conscientiousness and suicidality stratified by occupational status. Adjusted by age, education, region, income, chronic illness, and major depressive episode.

sociated with suicidality, and extraversion is negatively associated with suicidality, replicate the results of a meta-analysis.⁵² While there are conflicting results regarding conscientiousness,⁵³ some evidence implies it is negatively associated with suicidality.^{39,54} Interestingly, openness (interest in art, rich imagination) had a significant positive association with suicidality, possibly because people with high openness may be more impulsive when faced with stressful situations.⁵⁵ Additionally, according to previous research, high openness accelerates engagement in risky behaviors.³⁷ Indeed, openness showed a positive association with suicidality in a clinical sample of depressed adults aged 50 years and above.³⁸

The finding of no significant association between marital status, occupational status, and suicidality can be interpreted in several ways. As mentioned in the introduction, previous research has yielded controversial results regarding the association between these statuses and suicide. This may be attributed to the heterogeneous characteristics of participants, including ethnicity, age, class, proportion of males, and source of control group (e.g., community, clinic, and deceased group). Furthermore, personal factors such as depression and substance abuse may interact with social factors (e.g., unemployment, no spouse or cohabitant) to influence suicide attempts, leading to suicide.⁵⁶ Similar to previous studies, our research showed that marital and occupational status may aggravate or attenuate the suicidality of vulnerable individuals, rather than induce suicidality. Neuroticism and conscientiousness were found to interact with marital status and occupational status, respectively, which supports the findings of prior studies as discussed above. If this result is applied to the existing diathesis-stressor model,⁴¹ unemployment and the inability to maintain marriage act as stressors, and high neuroticism and conscientiousness interact as diatheses to increase suicidality. Subsequent subgroup analyses indicated that participants in currently non-married categories were more prominently affected by neuroticism. For neurotic people susceptible to stress and sensitivity, the stress caused by divorce, bereavement, and living alone may act as an exacerbating factor.⁵⁷ Prior research examining the relationship between social proxies (including marital and occupational status) and suicide found that the results were related to the characteristics of the study group. Unmarried status was a risk factor in the group, which mainly comprised married people, and unemployment was a risk factor in the group with mostly employed participants.⁵⁸ Marriage is a standardized cultural criterion for middle-aged Korean adults, and failure to maintain marital status may cause feelings of thwarted belongingness, because such individuals might feel that they have deviated from the conventional norms of the mainstream group.⁵⁹ These stressors may increase the risk of suicide in temperamentally vulnerable, or neurotic in-

dividuals.

Full-time employment showed a protective effect on suicidality among more conscientious participants. Conscientiousness is a personality trait related to diligence and thoroughness. Thus, it plays a pivotal role in an individual's ability to maintain a stable job and has a positive role in maintaining self-esteem,⁶⁰ and may have a protective effect on suicidality. Part-time employment has been reported to increase suicide risk due to job insecurity.⁶¹ In this study, in the model without personality variables, the OR of part-time employment was higher than that of unemployment (Table 2), although it was not statistically significant. However, part-time employment × conscientiousness was not significant, and the OR was lower compared to that of the unemployment group in the subgroup analysis. This may be because participants with high conscientiousness hold a high regard for maintaining employment. Therefore, it can be assumed that working consistently, even at an unstable job, is more helpful in maintaining positive emotions than being unemployed. Meanwhile, according to a previous study, high conscientiousness was suggested to increase suicide risk in older adults, which was considered to be related to higher responsibilities and striving for achievement.⁶² In view of this, one can also estimate that high conscientiousness might increase suicide risk in those with part-time jobs or who are unemployed. In fact, for unemployment status in this analysis, the OR of conscientiousness was higher than 1, despite it being statistically insignificant.

The clinical implication of this study is that both personal and social factors should be considered when planning interventions to prevent suicide. It is important to select the target population whose risk factors have a stronger impact on suicidality, especially when creating active intervention policies for population groups who are living alone and are unemployed. Given that marriage and occupation can be indexed, they are also major targets of social welfare policies. Therefore, it can be of practical help to consider personality and sex when formulating marriage- and occupation-related policies.

This study has several strengths. First, the sample was extracted as a representative group of Korean adults by a rigorous statistical method. Owing to these methodological advantages, the results of this study can be generalized to the entire population of Korean middle-aged adults. Furthermore, the results of this survey were not self-reported, but were obtained face-to-face by well-trained interviewers. The results can also be considered reliable as structured tools that have been validated and tested in large-scale epidemiological studies. Finally, this study included more than 2,400 large-scale community participants and measured various demographic and clinical variables, which increases the generalizability of the findings.

However, this study also has several limitations. First, sui-

cidal ideation, suicidal plan, and suicide attempt were pooled as one variable named “suicidality.” According to previous studies, risk factors for suicidal ideation and suicide attempt were different.⁶³ Therefore, if the variables were analyzed separately, the results of this study might have been different. However, in this study, only nine participants (0.3%) reported a 1-year suicidal attempt, so it was difficult to derive statistically significant results. We believe that the number of participants should be supplemented in future large-scale observation studies.

Second, as the design of this study is cross-sectional, we were unable to reveal any temporal and causal relationships. However, since 1-year suicidality was only evaluated for the past year, the possibility of changes in personality or socioeconomic status due to suicidality is relatively low. Nevertheless, the possibility of reverse causality cannot be eliminated. Therefore, large-scale, community-based studies with a longitudinal design should be conducted.

Finally, indicators of socioeconomic status and interpersonal relationships were not included except for marital and occupational status. For example, previous studies have suggested that friendship has a protective effect on suicide risk.⁶⁴ Therefore, this study should be interpreted in terms of marital and occupational status rather than overall “social support.”

In conclusion, personality may be useful as a predictor of suicidality among middle-aged adults. Furthermore, marital status, occupational status, and sex may influence suicidality by interacting with personality. Hence, individualized social and psychological interventions according to individual personality traits are required for suicide prevention.

Availability of Data and Material

The datasets generated or analyzed during the study are available from the corresponding author on reasonable request.

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

Author Contributions

Conceptualization: Gihwan Byeon, Jong-Ik Park. Data curation: all authors. Formal analysis: Gihwan Byeon, Jong-Ik Park. Funding acquisition: Maeng Je Cho, Jong-Ik Park. Investigation: Gihwan Byeon, Jong-Ik Park. Methodology: Gihwan Byeon, Jong-Ik Park. Project administration: Gihwan Byeon, Jong-Ik Park. Resources: all authors. Software: Gihwan Byeon, Jong-Ik Park. Supervision: Jong-Ik Park. Validation: Gihwan Byeon, Jong-Ik Park. Visualization: Gihwan Byeon, Jong-Ik Park. Writing—original draft: Gihwan Byeon, Jong-Ik Park. Writing—review & editing: all authors.

ORCID iDs

Gihwan Byeon <https://orcid.org/0000-0002-7452-3440>
 Jee Eun Park <https://orcid.org/0000-0001-6097-3275>
 Jin Pyo Hong <https://orcid.org/0000-0001-5384-2605>
 Maeng Je Cho <https://orcid.org/0000-0001-8035-2679>
 Jong-Ik Park <https://orcid.org/0000-0002-1225-584X>

Funding Statement

This study was funded by the Korean Ministry of Health and Welfare, which had no role in study design; collection, analysis, and interpretation of data; writing of the report; or decision-making.

Acknowledgments

We thank the 12 local investigators and 79 interviewers who helped conduct this study.

Part of the statistical analysis was performed by Dr. Myoung-Nam Lim from the Biomedical Research Institute, Kangwon National University Hospital.

REFERENCES

- World Health Organization. Suicide rates, age-standardized, global health observatory (GHO) [Internet]. Available at: <https://www.who.int/data/gho/data/themes/mental-health/suicide-rates>. Accessed December 14, 2022.
- Alicandro G, Malvezzi M, Gallus S, La Vecchia C, Negri E, Bertuccio P. Worldwide trends in suicide mortality from 1990 to 2015 with a focus on the global recession time frame. *Int J Public Health* 2019;64:785-795.
- Cerel J, Jordan JR, Duberstein PR. The impact of suicide on the family. *Crisis* 2008;29:38-44.
- O’Dea D, Tucker S. The cost of suicide to society. Wellington: Ministry of Health; 2005.
- Shepard DS, Gurewich D, Lwin AK, Reed GA Jr, Silverman MM. Suicide and suicidal attempts in the United States: costs and policy implications. *Suicide Life Threat Behav* 2016;46:352-362.
- Pompili M. Exploring the phenomenology of suicide. *Suicide Life Threat Behav* 2010;40:234-244.
- O’Connor RC, Platt S, Gordon J. Achievements and challenges in suicidology: conclusions and future directions. In: O’Connor RC, Platt S, Gordon J, editors. *International handbook of suicide prevention: research, policy and practice*. Chichester: Wiley-Blackwell, 2011, p.625-642.
- Lim AN. A descriptive study on the economic activities of middle-aged adult wage workers. *Int J Adv Smart Converg* 2019;8:1-6.
- Kposowa AJ. Marital status and suicide in the national longitudinal mortality study. *J Epidemiol Community Health* 2000;54:254-261.
- Luoma JB, Pearson JL. Suicide and marital status in the United States, 1991-1996: is widowhood a risk factor? *Am J Public Health* 2002;92:1518-1522.
- Yip PS, Thorburn J. Marital status and the risk of suicide: experience from England and Wales, 1982-1996. *Psychol Rep* 2004;94:401-407.
- Brockington L. Suicide in women. *Int Clin Psychopharmacol* 2001;16 Suppl 2:S7-S19.
- Khan MM. Suicide on the Indian subcontinent. *Crisis* 2002;23:104-107.
- Milner A, Spittal MJ, Pirkis J, LaMontagne AD. Suicide by occupation: systematic review and meta-analysis. *Br J Psychiatry* 2013;203:409-416.
- Oyesanya M, Lopez-Morinigo J, Dutta R. Systematic review of suicide in economic recession. *World J Psychiatry* 2015;5:243-254.
- Price RH, Choi JN, Vinokur AD. Links in the chain of adversity following job loss: how financial strain and loss of personal control lead to depression, impaired functioning, and poor health. *J Occup Health Psychol* 2002;7:302-312.
- Claussen B, Bjørndal A, Hjort PF. Health and re-employment in a two year follow up of long term unemployed. *J Epidemiol Community Health* 1993;47:14-18.
- Yen YC, Yang MJ, Yang MS, Lung FW, Shih CH, Hahn CY, et al. Suicidal ideation and associated factors among community-dwelling elders in Taiwan. *Psychiatry Clin Neurosci* 2005;59:365-371.
- Chiu HF, Yip PS, Chi I, Chan S, Tsoh J, Kwan CW, et al. Elderly suicide

- in Hong Kong--a case-controlled psychological autopsy study. *Acta Psychiatr Scand* 2004;109:299-305.
20. Moon SS, Park SM. Risk factors for suicidal ideation in Korean middle-aged adults: the role of socio-demographic status. *Int J Soc Psychiatry* 2012;58:657-663.
 21. John OP, Donahue EM, Kentle RL. The Big Five Inventory--versions 4a and 54. Berkeley, CA: University of California, Institute of Personality and Social Research; 1991.
 22. Roccas S, Sagiv L, Schwartz SH, Knafo A. The Big Five personality factors and personal values. *Pers Soc Psychol Bull* 2002;28:789-801.
 23. McCrae RR. NEO-PI-R data from 36 cultures: further intercultural comparisons. In: McCrae RR, Allik J, editors. *The five-factor model of personality across cultures*. New York: Kluwer Academic/Plenum, 2002, p.105-125.
 24. McCrae RR, Costa PT Jr. Personality trait structure as a human universal. *Am Psychol* 1997;52:509-516.
 25. Pulver A, Allik J, Pulkkinen L, Härmäläinen M. A Big Five personality inventory in two non-Indo-European languages. *Eur J Pers* 1995;9:109-124.
 26. Schmitt DP, Allik J, McCrae RR, Benet-Martínez V. The geographic distribution of Big Five personality traits: patterns and profiles of human self-description across 56 nations. *J Cross Cult Psychol* 2007;38:173-212.
 27. Ozer DJ, Benet-Martínez V. Personality and the prediction of consequential outcomes. *Annu Rev Psycho* 2006;57:401-421.
 28. Paunonen SV. Big Five factors of personality and replicated predictions of behavior. *J Pers Soc Psychol* 2003;84:411-424.
 29. McCrae RR, Costa PT Jr. Validation of the five-factor model of personality across instruments and observers. *J Pers Soc Psychol* 1987;52:81-90.
 30. Bouchard TJ Jr, Lykken DT, Tellegen A, McGue M. Genes, drives, environment, and experience: EPD theory revised. In: Benbow CP, Lubinski DJ, editors. *Intellectual talent: psychometric and social issues*. Baltimore, MD: Johns Hopkins University Press, 1996, p.5-43.
 31. Enns MW, Cox BJ, Inayatulla M. Personality predictors of outcome for adolescents hospitalized for suicidal ideation. *J Am Acad Child Adolesc Psychiatry* 2003;42:720-727.
 32. Segal DL, Marty MA, Meyer WJ, Coolidge FL. Personality, suicidal ideation, and reasons for living among older adults. *J Gerontol B Psychol Sci Soc Sci* 2012;67:159-166.
 33. Fergusson DM, Beautrais AL, Horwood LJ. Vulnerability and resiliency to suicidal behaviours in young people. *Psychol Med* 2003;33:61-73.
 34. Duberstein PR, Conwell Y, Seidlitz L, Denning DG, Cox C, Caine ED. Personality traits and suicidal behavior and ideation in depressed inpatients 50 years of age and older. *J Gerontol B Psychol Sci Soc Sci* 2000;55:P18-P26.
 35. Kerby DS. CART analysis with unit-weighted regression to predict suicidal ideation from Big Five traits. *Pers Individ Differ* 2003;35:249-261.
 36. Tsoh J, Chiu HF, Duberstein PR, Chan SS, Chi I, Yip PS, et al. Attempted suicide in elderly Chinese persons: a multi-group, controlled study. *Am J Geriatr Psychiatry* 2005;13:562-571.
 37. Goldstein AL, Flett GL, Wekerle C, Wall AM. Personality, child maltreatment, and substance use: examining correlates of deliberate self-harm among university students. *Can J Behav Sci* 2009;41:241-251.
 38. Heisel MJ, Duberstein PR, Conner KR, Franus N, Beckman A, Conwell Y. Personality and reports of suicide ideation among depressed adults 50 years of age or older. *J Affect Disord* 2006;90:175-180.
 39. Useda JD, Duberstein PR, Conner KR, Beckman A, Franus N, Tu X, et al. Personality differences in attempted suicide versus suicide in adults 50 years of age or older. *J Consult Clin Psychol* 2007;75:126-133.
 40. Velting DM. Suicidal ideation and the five-factor model of personality. *Pers Individ Differ* 1999;27:943-952.
 41. Mann JJ, Waternaux C, Haas GL, Malone KM. Toward a clinical model of suicidal behavior in psychiatric patients. *Am J Psychiatry* 1999;156:181-189.
 42. Cho MJ, Seong SJ, Park JE, Chung IW, Lee YM, Bae A, et al. Prevalence and correlates of DSM-IV mental disorders in South Korean adults: the Korean epidemiologic catchment area study 2011. *Psychiatry Investig* 2015;12:164-170.
 43. Cho MJ, Chang SM, Lee YM, Bae A, Ahn JH, Son J, et al. Prevalence of DSM-IV major mental disorders among Korean adults: a 2006 national epidemiologic survey (KECA-R). *Asian J Psychiatr* 2010;3:26-30.
 44. World Health Organization. *Composite International Diagnostic Interview (CIDI), version 1.0*. Geneva: World Health Organization; 1990.
 45. Cho MJ, Hahm BJ, Suh DW, Hong JP, Bae JN, Kim JK, et al. Development of a Korean version of the Composite International Diagnostic Interview (K-CIDI). *J Korean Neuropsychiatr Assoc* 2002;41:123-137.
 46. Rammstedt B, John OP. Measuring personality in one minute or less: a 10-item short version of the Big Five Inventory in English and German. *J Res Pers* 2007;41:203-212.
 47. Kim SY, Kim JM, Yoo JA, Bae KY, Kim SW, Yang SJ, et al. Standardization and validation of Big Five Inventory-Korean version (BFI-K) in elders. *Korean J Biol Psychiatry* 2010;17:15-25.
 48. Park JE, Cho SJ, Lee JY, Sohn JH, Seong SJ, Suk HW, et al. Impact of stigma on use of mental health services by elderly Koreans. *Soc Psychiatry Psychiatr Epidemiol* 2015;50:757-766.
 49. Orsolini L, Latini R, Pompili M, Serafini G, Volpe U, Vellante F, et al. Understanding the complex of suicide in depression: from research to clinics. *Psychiatry Investig* 2020;17:207-221.
 50. Goldfarb MR, Trudel G. Marital quality and depression: a review. *Marriage Fam Rev* 2019;55:737-763.
 51. Álvaro JL, Garrido A, Pereira CR, Torres AR, Barros SC. Unemployment, self-esteem, and depression: differences between men and women. *Span J Psychol* 2019;22:E1.
 52. Brezo J, Paris J, Turecki G. Personality traits as correlates of suicidal ideation, suicide attempts, and suicide completions: a systematic review. *Acta Psychiatr Scand* 2006;113:180-206.
 53. Chioqueta AP, Stiles TC. Personality traits and the development of depression, hopelessness, and suicide ideation. *Pers Individ Differ* 2005;38:1283-1291.
 54. Voracek M. Suicide rate and national scores on the Big Five personality factors. *Percept Mot Skills* 2006;102:609-610.
 55. Sher KJ, Bartholow BD, Wood MD. Personality and substance use disorders: a prospective study. *J Consult Clin Psychol* 2000;68:818-829.
 56. Yoshimasu K, Kiyohara C, Miyashita K; Stress Research Group of the Japanese Society for Hygiene. Suicidal risk factors and completed suicide: meta-analyses based on psychological autopsy studies. *Environ Health Prev Med* 2008;13:243-256.
 57. Suls J, Martin R. The daily life of the garden-variety neurotic: reactivity, stressor exposure, mood spillover, and maladaptive coping. *J Pers* 2005;73:1485-1509.
 58. Calati R, Ferrari C, Brittner M, Oasi O, Olié E, Carvalho AF, et al. Suicidal thoughts and behaviors and social isolation: a narrative review of the literature. *J Affect Disord* 2019;245:653-667.
 59. Gunn JF 3rd, Lester D, Haines J, Williams CL. Thwarted belongingness and perceived burdensomeness in suicide notes. *Crisis* 2012;33:178-181.
 60. Satuf C, Monteiro S, Pereira H, Esgalhado G, Marina Afonso R, Loureiro M. The protective effect of job satisfaction in health, happiness, well-being and self-esteem. *Int J Occup Saf Ergon* 2018;24:181-189.
 61. Min KB, Park SG, Hwang SH, Min JY. Precarious employment and the risk of suicidal ideation and suicide attempts. *Prev Med* 2015;71:72-76.
 62. Szics A, Szanto K, Aubry JM, Dombrowski AY. Personality and suicidal behavior in old age: a systematic literature review. *Front Psychiatry* 2018;9:128.
 63. Bernal M, Haro JM, Bernert S, Brugha T, de Graaf R, Bruffaerts R, et al. Risk factors for suicidality in Europe: results from the ESEMED study. *J Affect Disord* 2007;101:27-34.
 64. Marver JE, Galfalvy HC, Burke AK, Sublette ME, Oquendo MA, Mann JJ, et al. Friendship, depression, and suicide attempts in adults: exploratory analysis of a longitudinal follow-up study. *Suicide Life Threat Behav* 2017;47:660-671.