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Do the Relative Importance and Pattern of Correlates of Suicidal Ideation Vary by Age and Gender? Network Analyses

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ABSTRACT

This study examined age- and gender-related differences in correlates of suicidal ideation (SI) and their interrelationships. We used data from a nationally representative sample of adults aged 19 years or older who participated in the 2021 Korea Welfare Panel Study ($N = 10{,}364$). We examined six networks of SI and its sociodemographic, physical health, and psychological correlates by age (young, 19–39 years; middle-aged, 40–64 years; and old, over 65 years old) and by gender. Depression, subjective well-being (SWB), and self-esteem were the key SI correlates across all groups. Depression had the strongest direct associations with SI in all groups (edge weights: 0.23 in old women to 1.00 in middle-aged men). SWB was directly associated with SI in middle-aged men (−0.26), middle-aged women (0.27), and old women (−0.37). Self-esteem was indirectly related to SI through depression and SWB. Age- and gender-specific correlates included chronic illness for young women, job satisfaction and subjective physical health for middle-aged women, and family relationship satisfaction for older men and women, each showing stronger associations with SI than other correlates within their respective groups. Suicide prevention efforts may benefit from addressing both common and age- and gender-specific correlates of SI.

1 | Introduction

Suicide is a global public health concern, particularly in South Korea, which has the highest suicide rate among countries in the Organisation for Economic Co-operation and Development (OECD), at 24.1 per 100,000 population (OECD 2023). In response, numerous efforts have been made to identify key correlates of suicide as effective targets for suicide prevention.

Previous studies have suggested that the correlates of suicidal behaviour may vary by age and gender (Eisen et al. 2017; Lee et al. 2013). For example, a study of 5803 adults in South Korea found that low household income was a risk factor for suicidal ideation (SI) among women and adults aged between 25 and 44, whereas low educational attainment was more relevant among adults aged 65 years and older (Lee et al. 2013). Similarly, work and financial problems (Eisen et al. 2017; Narishige et al. 2014) were associated with suicide attempts in men, while family problems and loneliness are more strongly associated with suicide attempts in women (Narishige et al. 2014). Other studies have also found gender- and age-related differences in the association between economic problems and

suicide risk, with economic problems being more relevant for men and younger adults, while psychiatric disorders show a stronger association with suicide risk in women, and physical illness is more pronounced as a risk factor among older adults (Kim 2022).

While these findings suggest age- and gender differences in the correlates of SI, we know relatively little about how SI correlates are related to each other and the pattern of these relationships in relation to SI across age and gender (O'Connor and Nock 2014). Given that suicidal behaviour is understood as the outcome of complex interactions between various risk and protective factors (de Beurs et al. 2021), conventional approaches that focus solely on individual risk factors may overlook important nuances in these relationships. Network analysis offers a valuable analytical method for addressing this gap, as it allows for the examination of structural differences in the interplay of risk factors. For instance, a previous network analysis of 443 adolescents highlighted the importance of considering both protective and risk factors of suicidal behaviour, not only in isolation but also in interaction (Fonseca-Pedrero et al. 2024).

Findings from previous network analyses also suggest gender differences in key correlates and pathways leading to SI (Holman and Williams 2022). For example, a study of 1009 adolescents found that anhedonia was indirectly related to suicidality through sad mood rather than having a direct association (Cai et al. 2023). In addition, self-esteem played different roles in men's and women's networks: in the men, it was the strongest direct protective factor against SI, whereas in women, its influence on SI was mediated through depression and hopelessness (Holman and Williams 2022). These findings highlight the need to examine not only individual risk factors but also how they interact differently across age and gender. Given these considerations, we aimed to examine age- and gender-related differences in SI correlates identified in previous research. Understanding these variations is essential for identifying distinct pathways to SI and developing targeted, age- and gender-specific prevention strategies (O'Connor and Nock 2014).

To this end, we included a range of socio-demographic (e.g., education, household income), physical health (e.g., chronic illness), and psychological (e.g., depression, subjective well-being [SWB], and self-esteem) correlates in our network analysis to explore variations in their associations with SI across age and gender groups. Consistent with previous research, we expect that higher education and income levels are to be associated with a lower risk of SI (Eisen et al. 2017; Lee et al. 2013; Narishige et al. 2014), while poorer physical health is likely to increase SI risk (Kim 2022). Additionally, higher depression levels and lower SWB and self-esteem are expected to elevate SI risk (Holman and Williams 2022). However, the relative importance of these factors and their interconnections may differ by age and gender.

Thus, this study explores how key correlates of SI are interconnected and how their associations with SI vary across age and gender using network analysis in a nationally representative sample of 10,364 adults in South Korea.

2 | Methods

2.1 | Participants and Procedures

We analysed data from the 2021 Korea Welfare Panel Study (KoWePS), a longitudinal survey of a nationally representative sample of households in South Korea. A double sampling method, based on the 2005 Population and Housing Census, was used to stratify and select households. From a total of 237,682 enumeration districts, 517 districts were initially selected to assess the household income and economic activity status. Subsequently, 3500 ordinary household and 3500 low-income households were selected for the final sample.

For this study, we used wave 16 data, collected between March and June 2021 through face-to-face interviews conducted during household visits. In wave 16, a total of 13,144 participants from 5996 households completed the interview (household response rate: 96.1%). Of the 244 incomplete cases, 179 were due to refusal to participate, followed by death ($n = 28$), admission to nursing facilities or emigration ($n = 26$), household merger ($n = 7$), and untraceable cases ($n = 4$). Of the 13,144 participants, those aged 19 years and older were included ($N = 11{,}408$). We analysed the data from 10,364 participants, excluding 1044 participants who had missing data on the study variables. We divided participants into six groups according to age (i.e., young, 19–39 years; middle-aged, 40–64 years; and old, ≥ 65 years) and gender: young ($n = 902$), middle-aged ($n = 1937$), and old men ($n = 1600$); young ($n = 1104$), middle-aged ($n = 2088$), and old women ($n = 2733$).

The sociodemographic characteristics of the participants are shown in Table S1. The mean age was 58.2 years (SD = 19.0). The majority were women (57.2%), married (59.5%), had a high school education or lower (65.7%), and were employed (58.5%). About half (44.5%) of them had an annual household income of less than 40 million Korean Won (KRW; approximately US $27,600), and 6.6% were recipients of basic livelihood security. The prevalence of SI among all participants was 1.8% and varied by age and gender, ranging from 0.9% in young men to 2.4% in old women.

The 2021 KoWePS was approved by the Institutional Review Board of the Korea Institute for Health and Social Affairs (2021–002).

2.2 | Measures

Suicidal behaviour refers to actions that have the potential to end one's life, whereas SI refers specifically to thoughts about ending one's own life (Turecki et al. 2019). In this study, SI was assessed with single-item measure: 'Have you ever seriously thought about suicide in the past 12 months?' (0 = 'no', 1 = 'yes').

Socio-demographic correlates included *marital status* (0 = never been married/widowed/divorced, 1 = married), *education* (0 = high school or below, 1 = college, 2 = university or above), *religion* (0 = no, 1 = yes), *employment* (0 = unemployed, 1 = employed), and *annual household income* (0 = less than

20 million KRW [equivalent to US $13,800] – 5 = more than 100 million KRW [equivalent to US $69,000]).

Physical health correlates included subjective physical health and chronic illness status. *Subjective physical health* was rated on a 5-point *Likert* scale (1 = 'excellent' – 5 = 'very poor'), with scores reversed so that higher scores indicate better physical health. The presence of *chronic illness* was defined by the history of medical treatment for chronic illness (0 = 'none', 1 = 'medical treatment for more than 3 months').

Psychological correlates included depression, SWB, self-esteem, and life satisfaction. *Depression* was measured using the 11-item version of the Center for Epidemiologic Studies Depression Scale (CES-D-11), which has demonstrated satisfactory internal consistency (Cronbach's $\alpha = 0.85–0.89$) and longitudinal measurement invariance in the general Korean populations (Park et al. 2022). Each item is rated on a 4-point *Likert* scale (0 = 'rarely or none of the time' – 3 = 'most or all the time'), and the total score ranges from 0 to 33 with higher scores indicating a greater severity of depressive symptoms. Cronbach's α in this study was 0.88. SWB was assessed using the Cantril Ladder, with a score of 0 indicating 'the worst possible life' and 10 indicating 'the best possible life' on this ladder. *Self-esteem* was measured using the Korean version of the Rosenberg Self-Esteem Scale (K-RSES), which has demonstrated adequate internal consistency (Cronbach's $\alpha = 0.75–0.87$) and construct validity in across various populations in Korea (Lee et al. 2009). The 10-item K-RSES is scored on a 4-point *Likert* scale (1 = 'mostly disagree' – 4 = 'always agree'), with scores ranging from 10 to 40, with higher scores indicating higher self-esteem. Cronbach's α in this study was 0.78. *Life satisfaction* was assessed by the degree of satisfaction in four domains (i.e., household income, job, family relationships, and social relationships) in the past year. It is rated on a 5-point *Likert* scale (1 = 'very dissatisfied' – 5 = 'very satisfied'), with higher scores indicating greater satisfaction in that domain.

2.3 | Statistical Analyses

We estimated networks of SI and its correlates (i.e., Mixed graphical model [MGM]) for each group using the R package *bootnet* and visualised networks using the Fruchterman-Reingold algorithm (Epskamp and Fried 2024). In the MGM, sociodemographic correlates (i.e., marital status, education, religion, employment, and annual household income) and chronic illness were included as categorical variables, while subjective physical health and psychological correlates (i.e., depression, SWB, self-esteem, and life satisfaction) were treated as continuous variables. In the network, nodes represent variables and edges represent associations between nodes (i.e., the conditional dependence relationships). The colour and thickness of the edge indicate the direction (blue for positive association and red for negative association) and the strength of the association (thicker edge indicates stronger association), respectively. We performed nonparametric bootstrapping based on 5000 bootstrap samples to estimate the accuracy of the edge weight. We also performed bootstrapped difference tests between edge weights to test whether they were significantly different from each other in the network using R package *bootnet* (Epskamp and Fried 2024).

In addition, we performed nine network comparison tests (NCTs) using the R package *NetworkComparisonTest* (Van Borkulo et al. 2019) to compare the six networks in terms of overall network structure, global strength (or overall connectivity, i.e., the weighted sum of the absolute connections), and individual edge weights: six NCTs between three age groups within the same gender (i.e., young vs. middle-aged men; young vs. old men; middle-aged vs. old men; young vs. middle-aged women; young vs. old women; and middle-aged vs. old women) and three NCTs between genders within the same age group (i.e., young men vs. women; middle-aged men vs. women; and old men vs. women).

To identify key correlates of SI across the six groups by age and gender, we estimated strength centrality using the R package *bootnet* (Epskamp and Fried 2024). This is the sum of the absolute edge weights connected to a given node, with higher values indicating greater importance in the network. The stability of centrality was examined by the correlation stability (CS) coefficient, using a case-dropping subset bootstrapping test ($N = 5000$). Its value should be at least 0.25 and preferably above 0.50 (Epskamp and Fried 2024). Bootstrapped difference tests were conducted to test whether the strength of two nodes was significantly different from each other using the R package *bootnet* (Epskamp and Fried 2024). Additionally, the predictability of each node was estimated using the R package *mgm* (Haslbeck and Waldorp 2020). Predictability represents the proportion of variance in a node explained by its neighbouring nodes and is visually depicted as the area of the rings surrounding each node in the network.

Finally, we examined the relative importance of each correlate on SI using the R package *Relaimpo* (Grömping 2007). Hierarchical multiple linear regression was used to determine the independent contribution of each predictor in the model predicting SI, while accounting for correlations between predictors. We also estimated bootstrapped confidence intervals (CI) that allow for statistical comparison of the strength of the different correlates on the outcome variable.

3 | Results

3.1 | Networks of the Correlates for Suicidal Ideation

Six networks of SI and its correlates are shown in Figure 1. Strong edges and central nodes are listed in Table 1. Stability analysis indicated that the six networks were accurately estimated, with adequate CIs around the edge weights (Figure S1).

The NCTs showed that the overall network structures of some groups differed from each other: young men = middle-aged men ≠ old men; young women = old women ≠ middle-aged women; young men ≠ young women. There were also significant differences in the global strength of the networks: young men < middle-aged men = old men; young women < middle-aged women; middle-aged women < middle-aged men. The percentage of significantly different edges between groups ranged from 6.7% (young men vs. young women) to 18.1% (young vs. old men; Table S2).

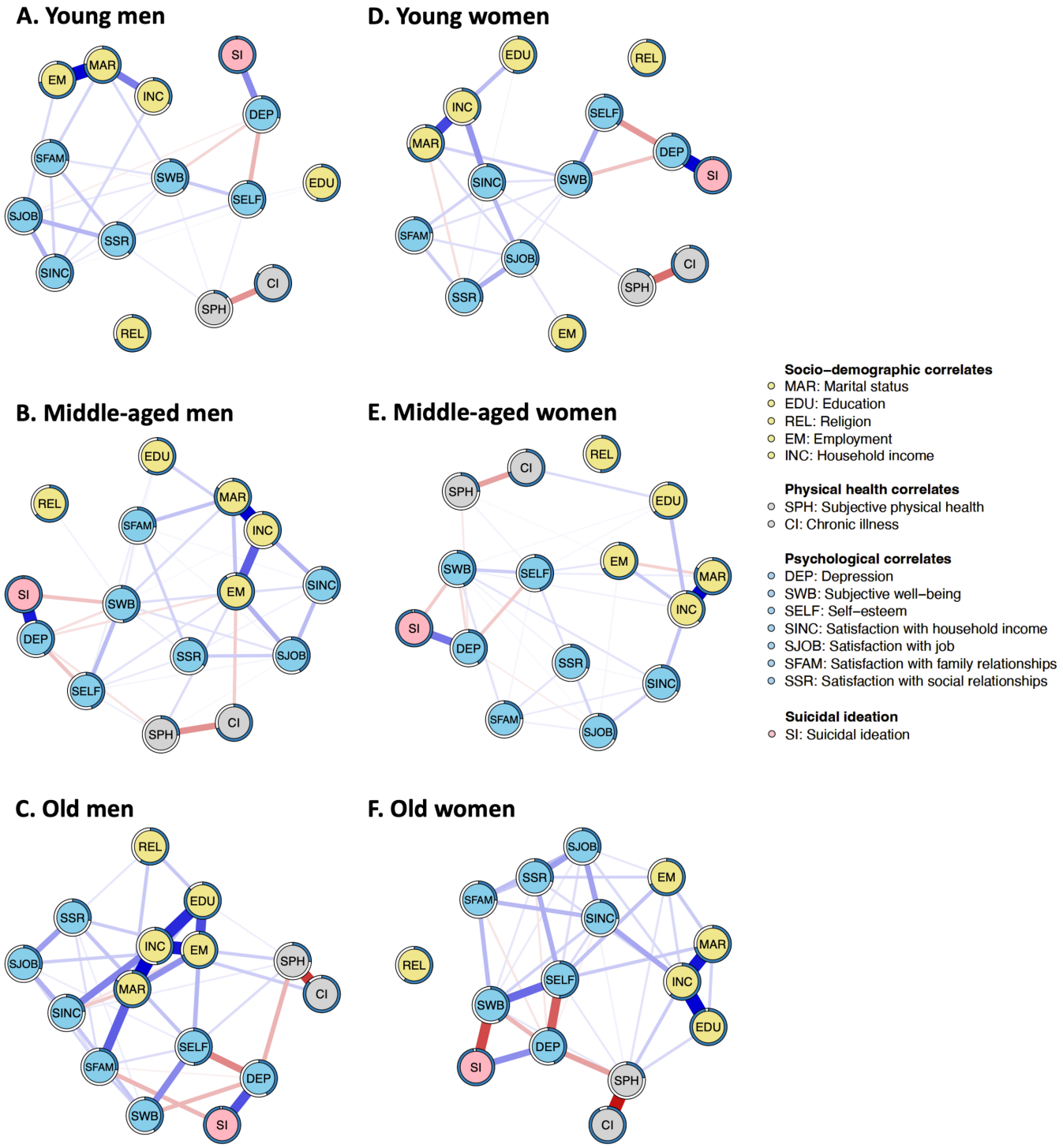

FIGURE 1 | Networks of the correlates of suicidal ideation across age and gender. *Note:* Young (19–39 years), middle-aged (40–64 years), old (≥ 65 years). CI: chronic illness; DEP: depression; EDU: education; EM: employment; INC: household income; MAR: marital status; REL: religion; SELF: self-esteem; SFAM: satisfaction with family relationships; SI: suicidal ideation; SINC: satisfaction with household income; SJOB: satisfaction with job; SPH: subjective physical health; SSR: satisfaction with social relationships; SWB: subjective well-being.

The top five edges across six networks were: household income-marital status (0.48 to 1.34); depression-SI (0.23 to 1.00); self-esteem-depression (−0.26 to −0.33); self-esteem-SWB (0.21 to 0.30); and household income-satisfaction with household income (0.18 to 0.32; Figure S2). There were also some age and gender differences: subjective physical health-depression (0.13 and 0.19 for middle-aged and old men, 0.12, and 0.19 for middle-aged and old women, respectively) and employment-self-esteem (0.12 and 0.18 for middle-aged and old men, 0.13, and 0.12 for middle-aged and old women, respectively) for middle-aged and old groups, with their edge weights being higher in these groups than in young adults. In addition, the edge of marital status-satisfaction with family relationship (0.17, 0.26, and 0.40 for young, middle-aged, and old men,

TABLE 1 | Edges and central nodes for the networks.

	Men			Women		
	Young ($n = 902$)	**Middle-aged ($n = 1937$)**	**Old ($n = 1600$)**	**Young ($n = 1104$)**	**Middle-aged ($n = 2088$)**	**Old ($n = 2733$)**
No. of nonzero edges (% possible)						
	28 (26.7%)	38 (36.2%)	43 (41.0%)	25 (23.8%)	35 (33.3%)	41 (39.0%)
Global strength[a]						
	5.43	8.28	8.21	4.86	7.09	6.00
Top five edges[b]						
First	EM–MAR (0.98)	INC–MAR (1.10)	INC–MAR (0.63)	DEP–SUI (0.76)	INC–MAR (1.34)	INC–EDU (0.52)
Second	INC–MAR (0.51)	DEP–SUI (1.00)	INC–EM (0.58)	INC–MAR (0.56)	DEP–SUI (0.73)	SPH–CI (−0.48)
Third	DEP–SUI (0.45)	INC–EM (0.71)	INC–EDU (0.53)	SPH–CI (−0.44)	SPH–CI (−0.49)	INC–MAR (0.48)
Fourth	SPH–CI (−0.42)	SPH–CI (−0.48)	SPH–CI (−0.50)	INC–SINC (0.32)	INC–EDU (0.33)	SWB–SUI (−0.37)
Fifth	SINC–SJOB (0.30)	EM–SJOB (0.33)	EM–EDU (0.44)	SELF–DEP (−0.31)	INC–SINC (0.31)	SELF–DEP (−0.33)
Top five central nodes (strength centrality)[c]						
First	MAR (2.50)	INC (1.99)	INC (2.16)	DEP (1.70)	INC (2.50)	INC (1.92)
Second	EM (0.91)	EM (1.29)	EM (1.54)	INC (1.21)	MAR (1.32)	SELF (1.11)
Third	DEP (0.55)	MAR (1.08)	MAR (1.17)	MAR (1.03)	DEP (0.81)	SWB (1.08)
Fourth	SWB (0.44)	DEP (0.89)	EDU (0.54)	SINC (0.69)	SWB (0.51)	DEP (0.80)
Fifth	SJOB (0.34)	SWB (0.49)	SELF (0.22)	SWB (0.67)	SELF (0.33)	SPH (0.65)

Note: Young (19–39 years), middle-aged (40–64 years), old (≥ 65 years).

Abbreviations: CI: chronic illness; DEP: depression; EDU: education; EM: employment; INC: household income; MAR: marital status; SELF: self-esteem; SI: suicidal ideation; SINC: satisfaction with household income; SJOB: satisfaction with job; SPH: subjective physical health; SSR: satisfaction with social relationships; SWB: subjective well-being.

[a]NCT' results for global strength: young men < middle-aged men = old men; young women < middle-aged women; middle-aged women < middle-aged men.

[b]Partial correlation coefficients are shown in parentheses.

[c]Strength coefficients (z-scores) are shown in parentheses.

respectively) was observed only for men, and the edge weights were higher than those of the same age group of women.

Across all groups, depression had the strongest direct association with SI (0.23 to 1.00). However, the strength of the depression-SI edge varied by age and gender, with its strength being significantly lower in old women than in young and middle-aged women and in old men than in middle-aged men. SWB was also directly related to SI in middle-aged men and women and old women (−0.26 to −0.37), but its strength did not differ significantly between groups. Additionally, for old men, satisfaction with family relationship was negatively associated with SI (−0.18), but their edge weights did not differ from those of the groups.

CS coefficients for strength centrality across all six networks were above the minimum threshold of 0.25: 0.44 for young men, 0.75 for middle-aged men, 0.36 for old men, 0.28 for young women, 0.75 for middle-aged women, and 0.36 for old women. In terms of strength centrality, household income, marital status, depression, and SWB were the most central nodes across age and gender (Figures 2 and S3). Unlike other groups, depression and SWB were not a central nodes for old men, whereas education was central for this group. Additionally, employment was a central node only for men.

3.2 | Relative Importance of Correlates Over SI

The explained variance of the SI correlates varied across groups, ranging from 5.2% for the young men to 14.3% for the young women (Figure 3). Depression and SWB had a greater explanatory power for SI than other correlates across all groups. The variance explained by depression varied across groups from 2.5% for young men to 7.8% for middle-aged men. The variance explained by SWB ranged from 1.3% for young men to 2.4% for old women. In addition, self-esteem showed a significantly higher explanatory power for SI than some correlates in all groups (ranging from 0.6% for middle-aged men to 1.6% for middle-aged women), except for young men. There were also age- and gender-specific correlates of SI: chronic illness for young women, satisfaction with job and subjective physical health for

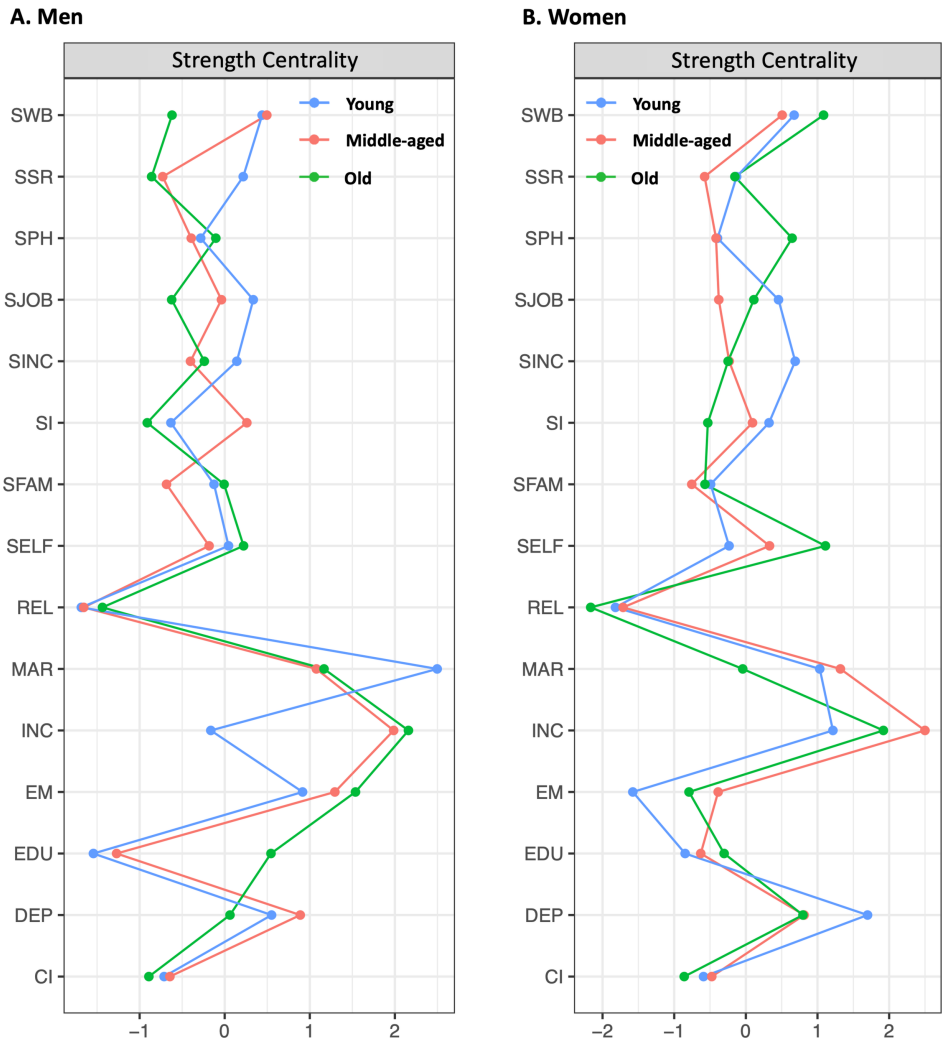

FIGURE 2 | Standardised strength centrality of the correlates of suicidal ideation across age and gender. *Note:* Young (19–39 years), middle-aged (40–64 years), old (≥ 65 years). CI: chronic illness; DEP: depression; EDU: education; EM: employment; INC: household income; MAR: marital status; REL: religion; SELF: self-esteem; SFAM: satisfaction with family relationships; SI: suicidal ideation; SINC: satisfaction with household income; SJOB: satisfaction with job; SPH: subjective physical health; SSR: satisfaction with social relationships; SWB: subjective well-being.

middle-aged women, and satisfaction with family relationships for old men and women.

4 | Discussion

This study examined age- and gender differences in key correlates of SI and their interrelationships. Results from several analyses indicated that depression, SWB, and self-esteem were the key correlates of SI across age and gender, consistent with findings from previous network analyses (Holman and Williams 2022).

As a major risk factor for suicide, depression showed the strongest direct association with SI in all groups, but the strength of the association varied by age and gender. The strength of the depression-SI association was lower in old adults than in young and middle-aged adults, suggesting that the importance of SI correlates may vary across different life stages. Depression appears to play a greater role in SI in young adults, whereas correlates such as physical health and social isolation contribute more to SI in older adults (De Leo 2022).

SWB was another key correlate that was directly related to SI in middle-aged men and women and old women, even after controlling for other key correlates such as depression (Westerhof and Keyes 2010). SWB may act as a psychological buffer against SI, as suggested by a study of 129 university students in Germany, which found that SWB attenuated the impact of stressful life events on SI (Brailovskaia et al. 2020).

Self-esteem was also an important psychological correlate of SI, as indicated by its greater relative importance among SI correlates. However, its association with SI was indirect, via its strong associations with depression and SWB. This aligns with findings from a recent network analysis of 443 adolescents, which showed that self-esteem was negatively associated with suicidal behaviours, even after controlling for factors such as depression (Fonseca-Pedrero et al. 2024).

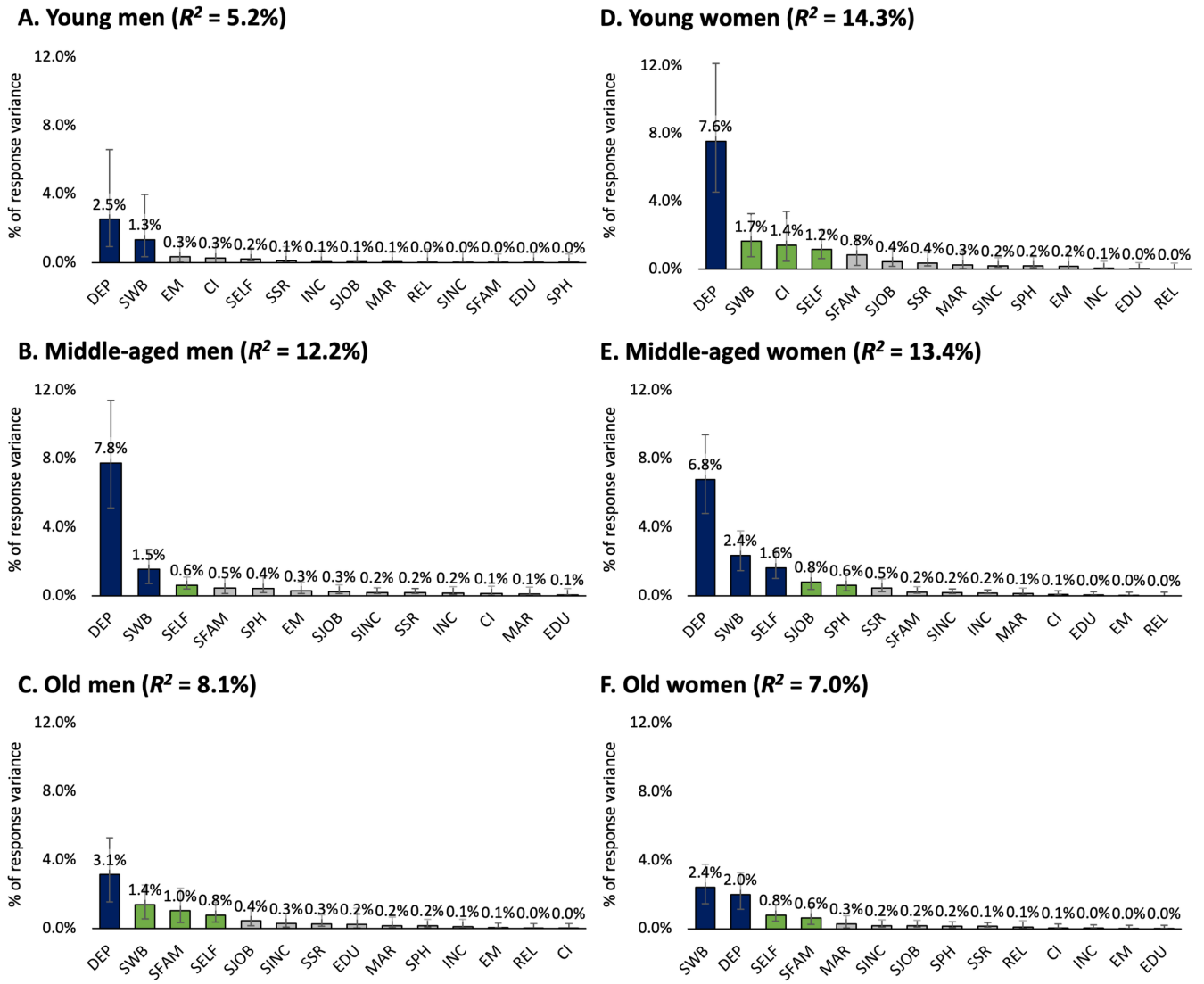

FIGURE 3 | Relative importance of correlates of suicidal ideation across age and gender. *Note:* Young (19–39 years), middle-aged (40–64 years), old (≥ 65 years); the colour of the bars indicates the results of the statistical comparison of the strength between correlates for suicidal ideation (SI): Variables in blue indicate significantly greater explanatory power for SI compared to 10 or more other correlates, while variables in green indicate significantly greater explanatory power for SI compared to five–nine variables. CI: chronic illness; DEP: depression; EDU: education; EM: employment; INC: household income; MAR: marital status; REL: religion; SELF: self-esteem; SFAM: satisfaction with family relationships; SINC: satisfaction with household income; SJOB: satisfaction with job; SPH: subjective physical health; SSR: satisfaction with social relationships; SWB: subjective well-being.

In particular, given the strongest association of self-esteem with both depression and SWB in our study and its role as an important determinant of depression (Sowislo and Orth 2013) and well-being (Myers and Diener 2018), increasing self-esteem would be a potentially effective strategy for reducing SI. Additionally, according to the two-continua model, mental health (i.e., positive mental health; e.g., SWB) and mental illness (i.e., negative mental health; e.g., depression) are related but distinct constructs, and improving one does not necessarily change the other (Westerhof and Keyes 2010). Recent research supports the feasibility of psychological interventions to reduce suicidal risk by enhancing positive mental health, beyond the traditional approach of reducing negative mental health (e.g., for inpatients with suicide ideation or attempts, Huffman et al. 2014). Taken together, these findings suggest that suicide prevention may benefit from strategies that enhance these protective factors such as SWB and self-esteem.

In addition to these common correlates of SI, we also found some age- and gender-specific correlates that were associated with SI only in certain groups, suggesting that the importance of SI correlates may vary across different life stages (Johns et al. 2023). Specifically, for young women, chronic illness was an important correlate of SI. Chronic illness may be more distressing for young women because it may interfere with multiple developmental tasks (e.g., work, marriage, and childbirth; Hernández et al. 2019), which may contribute to SI.

On the other hand, for older men and women, satisfaction with family relationships was an important correlate of SI, consistent

with previous findings that low family relationship satisfaction may have a more pronounced negative impact on mental health in late adulthood (Thomas et al. 2017). Family relationships become increasingly important to the well-being of older adults as their social roles and interpersonal relationships outside the family decline over time. Notably, satisfaction with family relationships, an important correlate of SI in older adults, was associated with marital status for men but not for women. This aligns with a previous finding that marriage enhances well-being for men but not necessarily for women in East Asian countries (Hori and Kamo 2018). Similarly, a study of Korean older adults found that women living alone had higher life satisfaction than those living only with a spouse, whereas men living alone reported lower life satisfaction (Lee et al. 2024).

The Integrated Motivational–Volitional (IMV) Model of Suicidal Behaviour suggests SI emerges through the interaction of individual vulnerability factors and environmental influences during the pre-motivational phase. In this stage, negative life events and socio-environmental factors significantly impact psychological state, increasing SI risk (O'Connor and Kirtley 2018). In this study, low SWB, experiences of chronic illness in early adulthood, and negative family relationships in later life may function as such adverse environmental factors. Although chronic illness in early adulthood and negative family relationships was not directly connected to SI in the network analysis, they demonstrated significant relative importance. As proposed by the IMV model (O'Connor and Kirtley 2018), these factors may not act as direct triggers of SI but may contribute indirectly by fostering negative self-perceptions and emotional distress (e.g., depression), which, in turn, increase SI risk during the motivational phase.

Taken together, our findings suggest that suicide prevention interventions need to consider age- and gender-specific correlates of SI as well as general correlates. Relatedly, the life course framework suggests that suicide prevention strategies need to consider the domains of life transitions that individuals face at different stages of life, such as social relationships, health, housing, and employment (Johns et al. 2023). Additionally, prevention efforts should consider the complex interplay among these correlates. For example, in this study, the associations between self-esteem and employment, as well as between depression and subjective physical health, were particularly evident among middle-aged and old adults. Negative life events, such as illness or unemployment, may have a greater impact on self-esteem or depression in these age groups, thereby increasing the risk of SI (e.g., Guidry and Cukrowicz 2016). Therefore, identifying high-risk individuals and designing effective prevention strategies for this population requires careful consideration of factors such as illness and unemployment to develop more targeted and impactful interventions.

4.1 | Limitations

Our findings should be considered within their limitations. First, the cross-sectional design of the study precludes a causal interpretation of the relationship between the study variables. Second, because the ideation-to-action theories of suicide suggest that correlates predictive of SI may differ from correlates predictive of suicide attempt (O'Connor and Kirtley 2018), further research is needed to examine whether the relevance of the correlates examined also applies to suicide attempt. Third, the explanatory power of the correlates in this study was relatively low. In fact, the explained variance of SI by correlates ranged from 5.2% (young men) to 14.3% (young women). The correlates examined in this study had limited explanatory power, especially for young men and older men and women. This may be related to the limited representation of individuals with SI in this analysis (only 1.8%). The low predictive value may also be due to low statistical power resulting from the use of a binary variable to measure SI. Inclusion of key correlates of suicidal behaviour suggested by suicide theories, such as entrapment and defeat (O'Connor and Kirtley 2018), or some age- or gender-specific correlates, such as social isolation/loneliness for older adults (De Leo 2022), would improve explanatory power. Lastly, this study included data from 10,364 individuals across 5097 households, and 9% of cases (8% with two household members and 1% with three) across the six networks coming from the same household, potentially introducing dependence among observations. To assess its potential impact, we conducted a re-analysis excluding cases where multiple household members were included in the same network ($N = 9407$). The results (not shown) remained consistent. However, future studies may consider addressing this issue using analytical approaches such as multi-level network models.

4.2 | Conclusion

Nonetheless, our findings have contributed to a comprehensive yet detailed understanding of similarities and differences across different age and gender groups in key correlates of SI, as well as the pattern of the interrelationships of these correlates in relation to SI, in a large and nationally representative sample of adults in Korea. Suicide prevention efforts may benefit from consideration of general, as well as age- and gender-specific, correlates of SI.

Ethics Statement

This study is a secondary analysis of 2021 Korea Welfare Panel Study data. The 2021 Korea Welfare Panel Study was approved by the Institutional Review Board of the Korea Institute for Health and Social Affairs (2021-002). The study was performed in accordance with the ethical standards in the 1964 Declaration of Helsinki and its later amendments.

Consent

Study participants provided written informed consent.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data used in this study are available from Korea Welfare Panel Study (https://www.koweps.re.kr:442/eng/data/data/list.do).

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Data S1.**