Suicide among university students in South Korea during the COVID-19 pandemic: the application of interpersonal-psychological theory and early maladaptive schema

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Background. This study examined the application of interpersonal-psychological theory and early maladaptive schema of suicidal ideation and suicide attempts in South Korean university students. **Methods**. In this cross-sectional study, data from 367 university students were surveyed using the Interpersonal Needs Questionnaire, Early Maladaptive Schema, Suicide Ideation Scale , and Acquired Capability for Suicide Scale. Data were collected between June 21 and July 21, 2021. **Results**. University students' interpersonal needs and early maladaptive schema were significantly associated with suicidal ideation, and influencing suicide attempts. The acquired capability for suicide moderated the relationship between suicidal ideation and attempts. **Conclusions**. In suicide prevention programs for university students, it is critical to consider their interpersonal needs and early maladaptive schema, and the acquired capability for suicide, to prevent suicidal ideation and attempts among them.

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2 **University Students in South Korea during the COVID-**
3 **19 Pandemic: The Application of Interpersonal-**
4 **Psychological Theory and Early Maladaptive Schema**
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Abstract

19 **Background**. This study examined the application of interpersonal-psychological theory and
20 early maladaptive schema of suicidal ideation and suicide attempts in South Korean university
21 students.
22 **Methods**. In this cross-sectional study, data from 367 university students were surveyed using
23 the Interpersonal Needs Questionnaire, Early Maladaptive Schema, Suicide Ideation Scale, and
24 Acquired Capability for Suicide Scale. Data were collected between June 21 and July 21, 2021.
25 **Results**. University students' interpersonal needs and early maladaptive schema were
26 significantly associated with suicidal ideation, and influencing suicide attempts. The acquired
27 capability for suicide moderated the relationship between suicidal ideation and attempts.
28 **Conclusions**. In suicide prevention programs for university students, it is critical to consider
29 their interpersonal needs and early maladaptive schema, and the acquired capability for suicide,
30 to prevent suicidal ideation and attempts among them.
31

Introduction

33 Recently, there have been concerns worldwide that the coronavirus disease (COVID-19)
34 pandemic may increase the risk of suicide (Gunnell et al., 2020). Additionally, it has been
35 reported that suicidal ideation is increasing among adults due to the COVID-19 pandemic
36 (Czeisler et al., 2021; Fortgang et al., 2021). Furthermore, a study analyzing suicidal tendencies
37 due to the COVID-19 pandemic emphasized the need to consider its impact on suicidal ideation
38 and self-harm among the youth (John et al., 2020).

39 South Korea has the highest suicide mortality rate among member countries of the Organization
40 for Economic Co-operation and Development (OECD) at 24.6 per 100,000 people (OECD,
41 2020). Furthermore, exploring the trend over the past 30 years, the suicide mortality rate in most
42 OECD countries has decreased by 30%; however, it has increased in South Korea (OECD,
43 2020). On investigating the proportion of deaths due to suicide among the deceased,
44 differentiated by life stage, suicide has been identified as the leading cause of death among
45 Koreans in their 20s since 2007 (Statistics Korea, 2019). This indicates the severity of the suicide
46 problem among youth and university students in South Korea.
47 Various factors affect suicide among university students, including demographic and economic
48 factors and mental health (Uchida & Uchida, 2017). Interpersonal relationships is one of the
49 primary reasons for suicide. Joiner et al. (2005) explain that suicidal ideation is caused by
50 experiencing a feeling of being burdened from feeling incompetent and feelings of thwarted
51 belongingness due to not being a valuable member of the group. This leads to suicide when the
52 acquired capability for suicide, decreased physical pain tolerance, and fearlessness of death are
53 added to the aforementioned feelings.
54 Adolescence is a period of forming relationships and developing intimacy within those
55 relationships (Erikson, 1994). However, social distancing due to COVID-19 has reduced
56 university students' opportunities to have a social life (Kim & Park, 2021). These changes to
57 university students' daily lives are likely to cause mental health problems.
58 A qualitative study on COVID-19-related stress among South Korean university students found
59 that they experienced stress and anxiety due to concerns about poor academic quality, social
60 disruption, the decline in employment, and health and safety (Kim & Park, 2021). Additionally,
61 in a survey of 195 university students in the United States, 91% reported stress, anxiety,
62 depression, and fear of losing relationships with loved ones due to the COVID-19 pandemic, and
63 86% reported a decrease in social interaction (Son et al., 2020). Based on this, the interpersonal-
64 psychological theory of suicide (Joiner et al., 2005; Van Orden et al., 2012) may be a helpful
65 model for explaining suicide among adolescents during the COVID-19 pandemic.
66 Another interpersonal-related factor affecting suicide is the early maladaptive schema. Early
67 maladaptive schema is an evaluation of oneself and others, a collection of memories, emotions,
68 body sensations, and cognitions related to childhood developmental topics such as abandonment,
69 abuse, neglect, and rejection (Young & Brown, 2005). Early maladaptive schema is a factor
70 related to past interpersonal relationships and affects mental health problems, including
71 depression, anxiety, and even suicidal ideation (Rezaei et al., 2016; Khosravani et al., 2019;
72 Kaya & Aydin, 2021).
73 Recently, the three-step theory (3ST) of suicide was developed by Klonsky & May (2015).
74 Accordingly, the first step of suicide is the development of suicide ideation, the second step is
75 strong versus moderate ideation, and the final step is progression from ideation to attempts.
76 Suicide ideation and suicide attempts are strong antecedents of suicide (Klonsky, May & Saffer,
77 2016). Thus, we should pay attention to suicidal ideation and suicide attempts to explain suicide.

78 However, few studies have simultaneously identified early maladaptive schema and Joiner's
79 theory as correlated factors leading to suicidal ideation and attempts.
80

Objective
82 This study aims to verify a model in which interpersonal-related factors explain suicidal ideation
83 and attempts among university students during the COVID-19 pandemic, by utilizing early
84 maladaptive schema and Joiner's interpersonal-psychological theory of suicide.
85

Materials & Methods
Study design
88 This cross-sectional survey study aims to construct and verify a model, to explain and predict
89 suicide among university students during the COVID-19 pandemic. This model is developed
90 utilizing early maladaptive schema and Joiner's interpersonal-psychological theory.
91 This structural model study verified the moderating effect of acquired capability on the pathway
92 to increasing suicidal ideation and suicide attempts (*Fig. 1*).
93

Study participants
95 University students aged 19 or older, currently enrolled in a university in South Korea, who
96 understood this study's purpose, agreed to participate in the study, and were able to respond to
97 the questionnaire, were included in this study using convenience sampling. University students
98 who had difficulties communicating and responding to questionnaires due to severe stress or
99 psychotic symptoms were excluded from the study. For the structural equation model, the
100 appropriate sample size is considered 10–20 times the number of observed variables or 150–400
101 participants based on the maximum likelihood estimation (Woo, 2014). In this study, 120–240
102 participants were required for 12 observed variables. We received 367 responses; all 367 were
103 included for data analysis to secure a sufficient sample.
104

Study measures
Interpersonal needs
107 The Interpersonal Needs Questionnaire's Korean version (K-INQ) was used as a self-report scale
108 to evaluate feelings of burden and thwarted belongingness. Van Orden et al. (2012) validated the
109 seven-point scale of 25 items developed by Joiner et al. (2009) to 15 items, and Lee, Lee and Oh
110 (2015) completed the K-INQ with 13 items. In this study, the 13-item K-INQ was used after
111 obtaining permission from the authors. Based on how they were feeling after the COVID-19
112 pandemic, students were requested to mark each item from one to seven (1 indicated "strongly
113 disagree" and 7 indicated "strongly agree") depending on the extent to which they agreed with
114 the statements. In Van Orden et al.'s (2012) and Lee, Lee and Oh's (2015) studies, the reliability
115 of all the items was .85 and .86, respectively; in this study the reliability was .91.
116

117 ## Early maladaptive schema

118 To measure early maladaptive schema, the Young Short Questionnaire Short Form (YSQ-Short
119 Form) developed by Young (1999) and adapted by Choi and Lee (2018) was used. The YSQ-
120 Short Form questionnaire comprises 15 sub-factors in 75 questions and is rated on a six-point
121 Likert scale (1 indicated "strongly disagree" and 6 indicated "strongly agree") depending on how
122 well each statement represents the participants' views. The higher the score, the more the
123 characteristics of the schema measured are reflected. In this study, the reliability was .97.
124

125 ### Suicidal ideation and suicide attempt

126 To measure suicidal ideation, a tool adapted by Kim (2002) from the Suicide Ideation Scale
127 (SIS) developed by Harlow, Newcomb and Bentler (1986) was used after obtaining permission
128 from the author. This is a five-point Likert scale (1 indicated "strongly disagree" and 5 indicated
129 "strongly agree"), wherein higher scores are indicative of stronger suicidal ideation. This scale
130 comprises five questions, including the following, "I have thought about suicide," "I have
131 thought about dying recently," "I have told someone that I want to attempt suicide," and "I have
132 thought that my life will end in suicide," which indicate suicidal ideation, and "I have attempted
133 suicide," which indicates a suicide attempt. To distinguish between suicidal ideation and a
134 suicide attempt, the sum of suicidal ideation scores from items one to four were used for suicidal
135 ideation, and the last item on the SIS was used to measure the experience of suicide attempts.
136 Harlow, Newcomb and Bentler (1986) determined the validity using factor analysis but did not
137 verify internal reliability. This tool's internal reliability was .81 in Ha's (2017) study and .85 in
138 this study.
139

140 ### Acquired capability for suicide

141 To measure the acquired capability for suicide, a scale developed by Van Orden et al. (2008),
142 which was translated into Korean and validated by Jo (2010), was used after obtaining
143 permission from the author. The scale comprises 20 items on a five-point Likert scale (0: very
144 different from me, 4: very similar to me), where higher scores indicated a higher capability for
145 fatal self-injury or suicide. The internal reliability was .85 and .80 in Van Orden et al.'s (2008)
146 and Jo's (2010) studies, respectively, and .81 in this study.
147

148 # Data collection

149 This study was approved by the Institutional Review Board of Semyung University (IRB No.
150 SMU-2021-05-001-01), and data were collected between June 21 and July 21, 2021. First, three
151 to four departments from the university were randomly selected, and permission was obtained
152 from the department heads to collect data through phone calls and visits. Subsequently, after
153 explaining the study's purpose and data collection method to the professors in charge of the
154 general elective and major subjects, we requested their cooperation. After class, a trained
155 research assistant explained the study's purpose, content, and methods to students, and only the
156 students who voluntarily agreed to participate in the study were required to sign the written

157 consent and complete the questionnaire. It took approximately 15 minutes to complete the
158 questionnaire, and a small reward (mobile gift voucher) was provided to the participants.
159

Data analysis

161 The data were analyzed using SPSS 24.0 program and AMOS 23.0 (IBM Corp., Armonk, NY).
162 Using the SPSS 24.0 program, the participants' general characteristics and measurement
163 variables were analyzed using descriptive statistics, and the correlation between variables was
164 analyzed with the Pearson correlation coefficient.
165 For structural model analysis, AMOS 23.0 was used to identify the goodness of fit for the
166 hypothetical model and the path coefficient's significance. The analysis is performed based on
167 the Chi-Squared test ($\chi 2$), standardized root means square residual (SRMR), normal fit index
168 (NFI), Tucker-Lewis index (TLI), comparative fit index (CFI), goodness-of-fit index (GFI), and
169 adjusted goodness-of-fit index (AGFI) to identify the model's goodness of fit. NFI, TLI, CFI,
170 GFI, and AGFI, indices of the model's goodness of fit, show ideal fit if they are 0.9 or higher. If
171 the SRMR is 0.8 or less, it is interpreted as an ideal fit. Multigroup structural equation modeling
172 was used to determine whether the capability for suicide was a moderating variable. A
173 multigroup analysis can help in determining whether the parameter estimates of models differ
174 among groups or whether the relationships established in the model differ according to group
175 affiliation (Kline, 1998).
176

Results

178

Suicidal ideation and suicide attempt according to the participants' general characteristics

181 The participants' mean age was 23.38 years ± 3.56 years; 21% were male and 79% were female
182 students. The first, second, third, and fourth grades accounted for 14.7%, 20.4%, 23.7%, and
183 41.1%, respectively, and the middle subjective economic level was the largest at 80.4%. The
184 residence composition was as follows: 83.7% of the participants lived with at least two people,
185 while 16.3% lived alone.
186 Of the participants, 3% had been infected with COVID-19, 48.8% had been tested for COVID-
187 19, and 11.7% had a self-isolation experience.
188 There were significant differences in suicidal ideation among the participants based on their
189 gender, grade, economic status, COVID-19 test experience, and self-isolation experience; female
190 students had significantly higher suicidal ideation than male students (t=-2.16, p=.031).
191 Additionally, it was found that the third grade had higher suicidal ideation than the first grade
192 (F=3.50, p=.016), the lower the economic status, the higher the suicidal ideation (F=3.38,
193 p=.035), and the more self-isolation experience due to COVID-19, the higher the suicidal
194 ideation (t=2.21, p=.028).

195   There was a significant difference in suicide attempts based on residence composition, and it was
196   found that suicide attempts were significantly higher in those living alone than in those living
197   with at least two people (t=-65, p=.009) (*Table 1*).
198

199   Correlation between perceived burdensomeness, thwarted belongingness,
200   early maladaptive schema, acquired capability, suicidal ideation, and
201   suicide attempts
202   Suicidal ideation had a significant positive correlation with perceived burdensomeness (r=.64,
203   p<.001), thwarted belongingness (r=.36, p=.001), and acquired capability (r=.28, p<.001).
204   Suicide attempts were significantly positively correlated with perceived burdensomeness (r=.37,
205   p<.001), thwarted belongingness (r=.17, p=.001), acquired capability (r=.19, p<.001), and
206   suicidal ideation (r=.55, p<.001). Perceived burdensomeness showed a significant positive
207   correlation with thwarted belongingness (r=.59, p<.001) and acquired capability (r=.22, p<.001),
208   but there was no significant correlation with early maladaptive schema (r=-.00, p=.940) (Table
209   2).
210

211   Structural equation modeling
212

213   Pathway analysis between interpersonal needs, suicidal ideation, and
214   suicide attempts
215   As a result of analyzing the pathway of interpersonal needs, early maladaptive schema, suicidal
216   ideation, and suicide attempts, based on this study's model, the model's goodness of fit was
217    $\chi2$=2.915 (p<.001), SRMR: .007, GFI: 1.000, AGFI: .998, TLI: 1.020, NFI: .999, and CFI:
218   1.000, which satisfied the fit criteria of the model (*Table 3*, *Fig. 2*).
219

220   Moderating effect of acquired capability for suicide on the relationship
221   between suicidal ideation and suicide attempts
222   To verify the moderating effect, it was classified into low and high groups based on the mean
223   value of the acquired capability for suicide, which was a moderating variable. The results of the
224   equal constrained model, in which the path coefficients of the two groups were equally
225   constrained, were $\chi2$=16.837 (p=.010), SRMR: .068, GFI: .985, AGFI: .948, TLI: .946, NFI:
226   .967, and CFI: .978, showing the suitability of the relationship presented in this study's
227   conceptual framework (*Table 3*, *Fig. 1*).

228   Analysis of the difference in the path coefficients between the low and high
229   groups with acquired capability for suicide
230   The analysis revealed a significant difference between the two pathways in the low and high
231   groups. The extent of change in $\chi2$ between the equal constrained and non-constrained models
232   were df = 1 to 7.057, indicating a significant moderating effect. The higher the suicidal ideation,

233 the more the number of suicide attempts was not significant in the group with low acquired
234 capability for suicide, but significant in the group with high acquired capability for suicide.
235 Therefore, the acquired capability for suicide significantly regulates the relationship between
236 suicidal ideation and suicide attempts (*Table 4*).
237
238 Discussion
239 This cross-sectional survey study aimed to construct and verify a model to explain and predict
240 suicide among university students during the COVID-19 pandemic by utilizing early
241 maladaptive schema and Joiner et al.'s (2005) interpersonal-psychological theory of suicide. The
242 results showed that interpersonal needs and early maladaptive schema influenced suicidal
243 ideation, and that the acquired capability for suicide was a factor in controlling the relationship
244 between suicidal ideation and suicide attempts. Overall, it was found that the hypothetical model
245 utilizing both, the early maladaptive schema and interpersonal-psychological theory of suicide
246 was the most suitable for explaining suicide attempts in Korean university students. This study is
247 consistent with a meta-analysis of studies on the relationship between early maladaptive schema
248 and suicidal ideation, identifying that early maladaptive schema is related to suicidal ideation
249 (Pilkington, Younan & Bishop, 2021).
250 Additionally, this study determined that university students' experience of living alone and self-
251 isolation had a significant relationship with suicide-related variables. Furthermore, it was found
252 that thwarted belongingness significantly affected suicidal ideation. Consistent with our study, a
253 study of 500 adults in the United States identified that they experienced thwarted belongingness
254 when quarantined at home, which consequently acted as a factor in influencing suicidal ideation
255 (Gratz et al., 2020). These results support the existing theory that frustration with belongingness
256 can increase the desire for suicide and the risk of suicide (Van Orden et al., 2010).

257 In Gratz et al.'s (2020) study, the feeling of burdensomeness after the pandemic was not
258 significantly correlated with suicidal ideation; however, this study identified that the feeling of
259 burdensomeness had a significant effect on suicidal ideation, showing a slight difference. This
260 study also demonstrated that a poor economic situation was related to suicidal ideation among
261 university students. This may be due to future-related stress and their economic situation. It was
262 found that suicidal ideation was significantly higher in the third grade than in the first grade.
263 Moreover, suicidal ideation increased significantly until the third grade but decreased slightly in
264 the fourth grade. This seems to be consistent with Hong and Lee's (2020) qualitative study
265 results; although South Korean nursing students are under a significant amount of pressure to
266 find employment as they get closer to their graduation, they learn to cope with stress while
267 maturing through various experiences during the fourth year.
268 In South Korea, the number of university students experiencing stress due to financial reasons
269 has increased since the pandemic because they were unable to find employment (Kim & Park,
270 2021). University students may have judged themselves as incompetent and considered
271 themselves a burden under these circumstances. Additionally, Classen and Dunn's (2012) study
272 demonstrated that although short-term unemployment is not related to an increase in suicide risk,

273   long-term unemployment is related to an increase in suicide risk. However, as this study
274   collected data for a considerable period after the COVID-19 outbreak, it can be interpreted that
275   the results were slightly different due to identifying the long-term effects when compared to
276   Gratz et al.'s (2020) study.
277   This study's results emphasize the relationship between interpersonal needs and early
278   maladaptive schema to the risk of COVID-19–related suicide among South Korean university
279   students. These findings suggest that interpersonal needs and early maladaptive schema may be
280   critical for suicide prevention and intervention. Unemployed university students whose
281   interpersonal relationships were disrupted during COVID-19 and who reported early maladaptive
282   schema should be targeted for intensive suicide prevention and intervention. Additionally,
283   interventions should be implemented to alleviate the negative psychological consequences of
284   social isolation and economic problems that may arise or worsen due to quarantine measures. For
285   example, universities should develop systems (e.g., entrance ceremony using metaverse) through
286   which students can communicate online and thereby experience a sense of belonging (Kim &
287   Park, 2021).
288   Universities should provide active livelihood support for their students by creating jobs related to
289   their education, such as creating jobs through practical institutions with industry-academic
290   linkage (Kim & Park, 2021). It is also necessary to allow university students to express their
291   emotions in various ways to help them with their uncertainty about the future and employment-
292   related stress, and prepare various systematic department adaptation or employment preparation
293   programs. Furthermore, as childhood trauma and adversity may be related to their interpersonal
294   needs, it is necessary to periodically examine their interpersonal needs or early maladaptive
295   schema to provide an effective intervention with insight into their suicidal ideation (Pilkington,
296   Younan & Bishop, 2021).
297   Finally, in individuals with high acquired capability for suicide, suicidal ideation directly
298   affected suicide attempts; however, the association was not significant in individuals with low
299   acquired capability for suicide. It is consistent with the interpersonal-psychological theory of
300   suicide (Joiner et al., 2005; Van Orden et al., 2010), which holds that the acquired capability for
301   suicide plays a moderating role in the relationship between suicidal ideation and suicide
302   attempts.
303   Based on these results, our capability to better predict and prevent suicide depends on a better
304   understanding of the transition from suicidal ideation to attempt. It was also found that intense
305   suicidal ideation leads to suicide only if there are means and capabilities (dispositional, acquired,
306   and practical) to attempt it (Dhingra, Klonsky & Tapola, 2019). For suicide prevention and
307   intervention, the acquired capability level for suicide should be evaluated by assessing a
308   participant's history of attempted suicide (Bostwick et al., 2016) and should be accompanied by
309   reduced access to lethal means of suicide, such as guns (Anestis & Capron, 2018). As there are
310   more suicides with briquettes and coal firelighters than suicides with guns in South Korea, it is
311   necessary to restrict the distribution and sale of briquettes and coal firelighters, and manage them
312   safely and systematically (Roh & Kang, 2019). It is also essential to train university students to

313 deal with negative emotions in an adaptive way and not resort to suicide (Hu et al., 2019; Kang
314 et al., 2019).
315 However, considering that in this study suicidal ideation among university students living alone
316 is significantly higher than among those living with their families, it may be challenging to use
317 the aforementioned methods to prevent suicide among those who live alone. Therefore, in a
318 country with a high suicide rate like South Korea, all citizens should receive gatekeeper-related
319 education and actively play their role to effectively prevent suicide. It is also vital to continue
320 funding and deploying staff to crisis hotlines so that individuals with limited social contact can
321 ask for help in emergencies (Gratz et al., 2020). Furthermore, as suicidal ideation was
322 significantly higher among university students with self-isolation experience than those without
323 self-isolation experience in this study, vulnerable individuals should be able to use and access
324 evidence-based remote mental health services during stay-at-home orders and other social
325 distancing adjustments (Reger, Stanley & Joiner, 2020).
326 Despite the significance of this study, there are several limitations. First, as the participants were
327 all university students living in South Korea, one should be cautious about generalizing the
328 results to other populations. Moreover, most of the participants in this study were women, and all
329 of them were nursing students. A report stated that men attempt suicide in a more lethal way than
330 women (Jordan, & McNiel, 2020) and a previous study indicated that there is a difference in the
331 socio-psychological problems experienced by college students in a pandemic situation according
332 to their major (Ha, & Park, 2021). It can be inferred that the sample bias makes it difficult to
333 generalize the study results. Therefore, further studies should expand the sampling range to other
334 countries and races. Second, this study cannot infer a causal relationship between variables as a
335 cross-sectional design was used. Additionally, there are limitations to self-report questionnaire
336 data that can be affected by social desirability bias or recall difficulties. Future studies should
337 adopt a clinical interview and longitudinal approach. Third, this study evaluated suicide attempts
338 using a single item of the SIS. Future studies need to further clarify suicidal ideation and
339 attempts by adding a scale for suicide attempts. This study is meaningful in that it theoretically
340 verified the interpersonal psychological theory, including early maladaptive schema for suicide
341 among Korean university students in a pandemic situation. The results can help provide a
342 theoretical rationale for understanding and preventing suicide in university students.

343 ## Conclusions

344 This study provides a theoretical rationale for understanding and preventing suicide among
345 Korean university students during a pandemic. When developing a suicide prevention program
346 for university students, their interpersonal needs and early maladaptive schema should be
347 considered. Additionally, as acquired capability for suicide was a moderating factor in the
348 relationship between suicidal ideation and suicide attempts, the acquired capability for suicide in
349 university students should also be managed in suicide prevention programs.
350

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353

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358

Ethical Considerations

360 This study was approved by the Institutional Review Board of Semyung University (IRB No.
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362

Disclosure Statement

365

Data Availability Statement

367 The data that support the findings of this study are available from the corresponding author upon
368 reasonable request.

369

References

371 Anestis MD, Capron DW. 2018. Deadly experience: The association between firing a gun and
372 various aspects of suicide risk. *Suicide & Life-threatening Behavior* 48(6):699–708. doi:
373 10.1111/sltb.12381.
374 Bierman KL, Coie JD, Dodge KA, Greenberg MT, Lochman JE, McMahon RJ, Pinderhughes E.
375 2010. The effects of a multiyear universal social–emotional learning program: The role of
376 student and school characteristics. *Journal of Consulting and Clinical Psychology* 78(2):156–
377 168. doi: 10.1037/a0018607.
378 Bostwick JM, Pabbati C, Geske JR, McKean AJ. 2016. Suicide attempt as a risk factor for
379 completed suicide: Even more lethal than we knew. *The American Journal of Psychiatry*
380 173(11):1094–1100. doi: 10.1176/appi.ajp.2016.15070854.
381 Choi NY, Lee YH. 2018. The relation between childhood trauma and early adulthood
382 interpersonal problem: The mediating effects of early maladaptive schemas, self-concept and
383 emotion regulation difficulties. *Korean Journal of Youth Studies* 25(2):137–166.
384 Classen TJ, Dunn RA. 2012. The effect of job loss and unemployment duration on suicide risk in
385 the United States: A new look using mass-layoffs and unemployment duration. *Health*
386 *Economics* 21(3):338–350. doi: 10.1002/hec.1719.
387 Czeisler MÉ, Lane RI, Wiley JF, Czeisler CA, Howard ME, Rajaratnam SMW. 2021. Follow-up
388 survey of US adult reports of mental health, substance use, and suicidal ideation during the
389 COVID-19 pandemic, September 2020. *JAMA Network Open* 4(2):e2037665. doi:
390 10.1001/jamanetworkopen.2020.37665.

391   Dhingra K, Klonsky ED, Tapola V. 2019. An empirical test of the Three-Step Theory of suicide
392   in UK university students. *Suicide & Life-threatening Behavior* 49(2):478–487. doi:
393   10.1111/sltb.12437.
394   Erikson EH. 1994. *Identity and the life cycle.* New York: Norton.
395   Fortgang RG, Wang SB, Millner AJ, Reid-Russell A, Beukenhorst AL, Kleiman EM, Bentley
396   KH, Zuromski KL, Al-Suwaidi M, Bird SA, Buonopane R, DeMarco D, Haim A, Joyce VW,
397   Kastman EK, Kilbury E, Lee HIS, Mair P, Nash CC, Onnela JP, Smoller JW, Nock MK. 2021.
398   Increase in suicidal thinking during COVID-19. *Clinical Psychological Science* 9(3):482–488.
399   doi: 10.1177/2167702621993857.
400   Gratz KL, Tull MT, Richmond JR, Edmonds KA, Scamaldo KM, Rose JP. 2020. Thwarted
401   belongingness and perceived burdensomeness explain the associations of COVID-19 social and
402   economic consequences to suicide risk. *Suicide & Life-threatening Behavior* 50(6):1140–1148.
403   doi: 10.1111/sltb.12654.
404   Gunnell D, Appleby L, Arensman E, Hawton K, John A, Kapur N, Khan M, O'Connor R, Pirkis
405   J, Yip PS, COVID-19 Suicide Prevention Research Collaboration. 2020. Suicide risk and
406   prevention during the COVID-19 pandemic. *The Lancet Psychiatry* 7(6):468–471. doi:
407   10.1016/S2215-0366(20)30171-1.
408   Ha JM. 2017. Effects of dating violence victimization on suicidal ideation. Master's thesis,
409   Chung-Ang University.
410   Ha J., Park D. (2021). Factors associated with psychosocial problems in Korean nursing and non-
411   nursing students during the COVID-19 pandemic. *PeerJ*, 9:e12541.
412   https://doi.org/10.7717/peerj.12541.
413   Harlow LL, Newcomb MD, Bentler PM. 1986. Depression, self-derogation, substance use, and
414   suicide ideation: Lack of purpose in life as a mediational factor. *Journal of Clinical Psychology*
415   42(1):5–21. doi: 10.1002/1097-4679(198601)42:1<5::aid-jclp2270420102>3.0.co;2-9.
416   Hong JE, Lee H. 2020. Experiences of hospital pre-employment among senior nursing students.
417   *Journal of Korean Academy of Psychiatric and Mental Health Nursing* 29(2):83–95. doi:
418   10.12934/jkpmhn.2020.29.2.83.
419   Hu CS, Huang J, Ferrari M, Wang Q, Xie D, Zhang H. 2019. Sadder but wiser: Emotional
420   reactions and wisdom in a simulated suicide intervention. *International Journal of Psychology:*
421   *Journal International de Psychologie* 54(6):791–799. doi: 10.1002/ijop.12536.
422   Indicators, Organisation for Economic Co-operation and Development. 2020. Health at a Glance.
423   Available at http://stats.oecd.org (accessed 7 January 2022).
424   Jo MH. 2010. Evaluation of interpersonal psychological model of suicide in Korean army.
425   Master's thesis, Korea University.
426   Jordan JT., McNiel DE (2020). Characteristics of persons who die on their first suicide attempt:
427   results from the National Violent Death Reporting System. *Psychological Medicine, 50*(8), 1390-
428   1397. https://doi.org/10.1017/s0033291719001375.
429   Joiner TE Jr, Conwell Y, Fitzpatrick KK, Witte TK, Schmidt NB, Berlim MT, Fleck MPA, Rudd
430   MD. 2005. Four studies on how past and current suicidality relate even when "everything but the

431   kitchen sink" is covaried. *Journal of Abnormal Psychology* 114(2):291–303. doi: 10.1037/0021-
432   843X.114.2.291.
433   Joiner TE Jr, Van Orden KA, Witte TK, Selby EA, Ribeiro JD, Lewis R, Rudd MD. 2009. Main
434   predictions of the interpersonal-psychological theory of suicidal behavior: Empirical tests in two
435   samples of young adults. *Journal of Abnormal Psychology* 118(3):634–646. doi:
436   10.1037/a0016500.
437   John A, Pirkis J, Gunnell D, Appleby L, Morrissey J. 2020. Trends in suicide during the covid-
438   19 pandemic. *BMJ* 371: m4352. doi:10.1136/bmj.m4352.
439   Kang N, You J, Huang J, Ren Y, Lin MP, Xu S. 2019. Understanding the pathways from
440   depression to suicidal risk from the perspective of the Interpersonal–Psychological Theory of
441   Suicide. *Suicide & Life-threatening Behavior* 49(3):684–694. doi: 10.1111/sltb.12455.
442   Kaya Y, Aydin A. 2021. The mediating role of early maladaptive schemas in the relationship
443   between attachment and mental health symptoms of university students. *Journal of Adult
444   Development* 28(5):15–24. doi: 10.1007/s10804-020-09352-2.
445   Khosravani V, Mohammadzadeh A, Bastan FS, Amirinezhad A, Amini M. 2019. Early
446   maladaptive schemas and suicidal risk in inpatients with bipolar disorder. *Psychiatry Research*
447   271:351–359. doi: 10.1016/j.psychres.2018.11.067.
448   Kim GS, Park YJ. 2021. A qualitative study on the stress of undergraduate due to COVID-19.
449   *The Journal of the Korea Contents Association* 21(9):644–651. doi:
450   10.5392/JKCA.2021.21.09.644.
451   Kim HS. 2002. A study on epistemology of Korean elder's suicidal thought. *Journal of Korean
452   Gerontological Nursing* 22(1):159–172.
453   Kline RB. 1998. Software review: Software programs for structural equation modeling: Amos,
454   EQS, and LISREL. *Journal of Psychoeducational Assessment* 16:343–364. doi:
455   10.1177/073428299801600407.
456   Klonsky ED, May AM. (2015). The three-step theory (3ST): A new theory of suicide rooted in
457   the "ideation-to-action" framework. *International Journal of Cognitive Therapy, 8*(2), 114–129.
458   Klonsky ED, May AM, Saffer BY. (2016). Suicide, suicide attempts, and suicidal ideation.
459   *Annual Review of Clinical Psychology, 12*(1), 307–30. https://doi.org/10.1146/annurev-clinpsy-
460   021815-093204.
461   Lee HY, Lee JA, Oh KS. 2015. Validation of the Korean version of Interpersonal Needs
462   Questionnaire (K-INQ). *Korean Journal of Clinical Psychology* 34(1):291–312.
463   Pilkington P, Younan R, Bishop A. 2021. Early maladaptive schemas, suicidal ideation, and self-
464   harm: A meta-analytic review. *Journal of Affective Disorders Reports* 3:100051. doi:
465   10.1016/j.jadr.2020.100051.
466   Reger MA, Stanley IH, Joiner TE. 2020. Suicide mortality and coronavirus disease 2019—A
467   perfect storm? *JAMA psychiatry* 77(11):1093–1094. doi: 10.1001/jamapsychiatry.2020.1060.
468   Rezaei M, Ghazanfari F, Rezaee F. 2016. The role of childhood trauma, early maladaptive
469   schemas, emotional schemas and experimental avoidance on depression: A structural equation
470   modeling. *Psychiatry Research* 246:407–414. doi: 10.1016/j.psychres.2016.10.037.

471   Roh H, Kang Y. 2019. The management of patient attempting suicide in the emergency room.
472   *The Journal of Medicine and Life Science* 16(3):60–63. doi: 10.22730/jmls.2019.16.3.60.
473   Son C, Hegde S, Smith A, Wang X, Sasangohar F. 2020. Effects of COVID-19 on college
474   students' mental health in the United States: Interview survey study. *Journal of Medical Internet*
475   *Research* 22(9):e21279. doi: 10.2196/21279.
476   Statistics Korea. 2019. The numbers of deaths and mortality rates by causes. Available at http://
477   https://kostat.go.kr/portal/korea/index.action (accessed 22 March 2021).
478   Uchida C, Uchida M. 2017. Characteristics and risk factors for suicide and deaths among college
479   students: A 23-year serial prevalence study of data from 8.2 million Japanese college students.
480   *The Journal of Clinical Psychiatry* 78(4):2512. doi: 10.4088/JCP.16m10807.
481   Van Orden KA, Cukrowicz KC, Witte TK, Joiner TE. 2012. Thwarted belongingness and
482   perceived burdensomeness: Construct validity and psychometric properties of the Interpersonal
483   Needs Questionnaire. *Psychological Assessment* 24(1):197–215. doi: 10.1037/a0025358.
484   Van Orden KA, Witte TK, Gordon KH, Bender TW, Joiner TE Jr. 2008. Suicidal desire and the
485   capability for suicide: Tests of the interpersonal-psychological theory of suicidal behavior among
486   adults. *Journal of Consulting and Clinical Psychology* 76(1):72–83. doi: 10.1037/0022-
487   006X.76.1.72.
488   Woo JP. 2014. *The misunderstanding and prejudice of structural equation models*. Seoul:
489   Hannare Publishing, 276–278.
490   Young JE. 1999. *Cognitive therapy for personality disorders: A schema-focused approach*. New
491   York: Professional Resource Press.
492   Young JE, Brown G. 2005. *Young Schema Questionnaire-Short Form; Version 3 (YSQ-S3,*
493   *YSQ)*. APA PsycTests. doi: doi.org/10.1037/t67023-000.

Figure Captions

495   **Figure 1: The study's conceptual framework based on Joiner's interpersonal needs model**
496   **Figure 2: Verification of research model**

Table 1(on next page)

Suicidal ideation and attempt according to the participants' general characteristics

Suicidal ideation and attempt according to the participants' general characteristics

1   **Table 1:**

2   **Suicidal ideation and attempt according to the participants' general characteristics**

Characteristics	Categories	n (%) or M±SD	Suicidal ideation		Suicide attempt	
		M±SD	M±SD	t or F (p)	M±SD	t or F (p)
Age (year)		23.38±3.56	7.90±3.58	1.375 (.136)	1.51±0.88	1.128 (.321)
Gender	Male	77 (21.0)	7.11±3.15	-2.161 (.031) *	1.49±0.09	-.209 (.834)
	Female	290 (79.0)	8.10±3.66		1.52±0.05	
Grade	1st	54 (14.7)	6.63±3.46	3.500 (.016) *	1.26±0.76	2.067 (.104)
	2nd	75 (20.4)	7.60±3.68	3>1	1.55±0.87	
	3rd	87 (23.7)	8.44±3.61		1.63±0.94	
	4th	151 (41.1)	8.18±3.46		1.52±0.88	
Residence	1	113 (30.8)	7.76±3.35	0.492 (.841)	1.49±0.86	0.710 (.664)
	2	37 (10.1)	7.16±3.37		1.35±0.59	
	3	5 (1.4)	8.40±4.16		1.60±0.89	
	4	15 (4.1)	7.67±2.50		1.20±0.56	
	5	115 (31.3)	8.09±3.57		1.58±0.90	
	6	49 (13.4)	8.45±4.33		1.63±1.20	
	7	9 (2.5)	7.56±4.30		1.56±0.88	
	8	24 (6.5)	7.79±3.73		1.45±0.72	
Economic status	Low	54 (14.7)	8.81±3.81	3.375 (.035)*	1.56±0.95	0.705 (.495)
	Middle	295 (80.4)	7.82±3.55		1.52±0.89	
	High	18 (4.9)	6.44±2.66		1.28±0.57	
Family composition	Living alone	60 (16.3)	8.03±3.33	.324 (.747)	1.78±1.01	2.649 (.009)*
	Living with at least 2	307 (83.7)	7.87±3.63		1.45±0.84	

		people				
COVID-19 confirmed experience	Yes	3 (0.8)	11.33±5.03	1.674 (.095)	2.00±1.00	0.960 (.338)
	No	364 (99.2)	7.86±3.56		1.50±0.88	
COVID-19 test experience	Yes	179 (48.8)	8.27±3.81	1.978 (.049) *	1.53±0.91	0.272 (.786)
	No	188 (51.2)	8.74±3.32		1.50±0.86	
Self-isolation experience	Yes	43 (11.7)	9.02±4.00	2.209 (.028) *	1.70±0.94	1.467 (.143)
	No	324 (88.3)	7.74±3.50		1.49±0.87	

3

Table 2(on next page)

Correlations among the major variables

Correlations among the major variables

1 **Table 2:**

2 **Correlations among the major variables**

Variables	Perceived burdensomeness	Thwarted belongingness	Early maladaptive schemas	Acquired capability for suicide	Suicidal ideation	Suicide attempts
Perceived burdensomeness	1					
Thwarted belongingness	.59 (p<.001)	1				
Early maladaptive schemas	-.00 (.940)	.05 (.940)	1			
Acquired capability	.22 (p<.001)	-.01 (.840)	-.06 (.246)	1		
Suicidal ideation	.61 (p<.001)	.36 (p<.001)	-.06 (.246)	.28 (p<.001)	1	
Suicide attempts	.37 (p<.001)	.17 (p=.001)	-.31 (.056)	.19 (p<.001)	.55 (p<.001)	1

3

Table 3(on next page)

Fitness of the models testing theory of suicide

Fitness of the models testing theory of suicide

1 **Table 3:**

2 **Fitness of the models testing theory of suicide**

	χ^2	p	Standardized root mean square residual	Goodness-of-fit index	Adjusted goodness-of-fit index	Tucker–Lewis index	Normed fit index	Comparative fit index
Research model	2.915	.000	.007	1.000	.998	1.020	.999	1.000
	16.837	.010	.068	.985	.948	.946	.967	.978

3

Table 4(on next page)

Difference in path coefficients between low and high acquired capability for suicide groups

1 **Table 4:**

2 **Difference in path coefficients between low and high acquired capability for suicide groups**
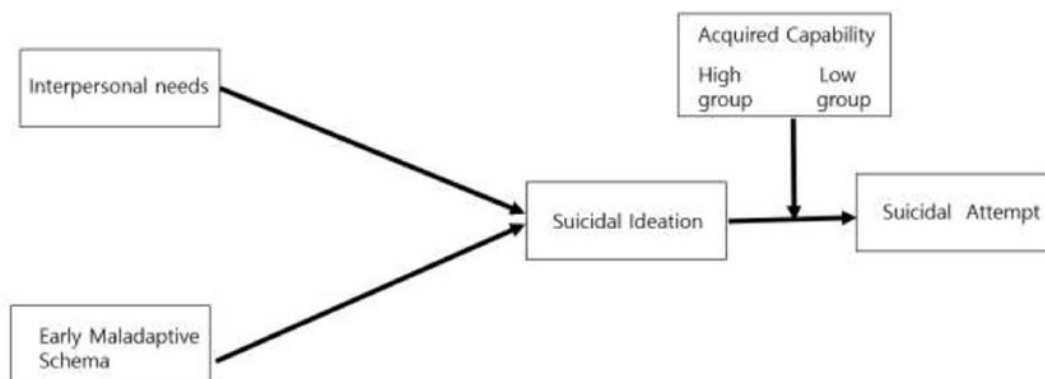
Path	df	$\Delta\chi2$	Coefficient	
			Low group **(β1)**	High group **(β2)**
Suicidal ideation → Suicide attempt	1	7.057	.011	12.169 (<.001) *

3 * *p*<0.001

Figure 1

The study's conceptual framework based on Joiner's interpersonal needs model

Figure 2

Verification of research model

Verification of research model

*: p<.05, **p<.01, ***p<.000