

# Korean Version of Inventory of Complicated Grief Scale: Psychometric Properties in Korean Adolescents

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## INTRODUCTION

Complicated grief occurs in the aftermath of loss and can manifest as 1) a sense of disbelief regarding death, 2) anger over the death, 3) recurrent suffering of painful emotions, with intense yearning and longing for the deceased, and 4) preoccupation with thoughts of the deceased with distressing intrusive thoughts (1,2). Complicated grief over a prolonged period with an intensified response can be distinguished from normal grief and other diseases such as major depressive disorder and post-traumatic stress disorder (PTSD) (3,4). Moreover, complicated grief in younger adults compared to older people has been reported to be more disruptive and disorganizing (1,5). Melhem et al. (6) found that exposure to parental death leads to an in-

We aimed to validate the Inventory of Complicated Grief (ICG)-Korean version among 1,138 Korean adolescents, representing a response rate of 57% of 1,997 students. Participants completed a set of questionnaires including demographic variables (age, sex, years of education, experience of grief), the ICG, the Children's Depression Inventory (CDI) and the Lifetime Incidence of Traumatic Events-Child (LITE-C). Exploratory factor analysis was performed to determine whether the ICG items indicated complicated grief in Korean adolescents. The internal consistency of the ICG-Korean version was Cronbach's  $\alpha = 0.87$ . The test-retest reliability for a randomly selected sample of 314 participants in 2 weeks was  $r = 0.75$  ( $P < 0.001$ ). Concurrent validity was assessed using a correlation between the ICG total scores and the CDI total scores ( $r = 0.75$ ,  $P < 0.001$ ). The criterion-related validity based on the comparison of ICG total scores between adolescents without complicated grief ( $1.2 \pm 3.7$ ) and adolescent with complicated grief ( $3.2 \pm 6.6$ ) groups was relatively high ( $t = 5.71$ ,  $P < 0.001$ ). The data acquired from the 1,138 students was acceptable for a factor analysis (Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.911; Bartlett's Test of Sphericity,  $\chi^2 = 13,144.7$ ,  $P < 0.001$ ). After omission of 3 items, the value of Cronbach's  $\alpha$  increased from 0.87 for the 19-item ICG-Korean version to 0.93 for the 16-item ICG-Korean version. These results suggest that the ICG is a useful tool in assessing for complicated grief in Korean adolescents. However, the 16-item version of the ICG appeared to be more valid compared to the 19-item version of the ICG. We suggest that the 16-item version of the ICG be used to screen for complicated grief in Korean adolescents.

**Keywords:** Complicated Grief; Adolescent; Factor Analysis, Statistical; Reliability of Results; Screening

creased risk for major depressive disorder and PTSD during the first year after the death and this can persist into the second year (6-8). In a subsequent study, Melhem et al. (6) reported that 10% of children bereaved by a sudden parental death experience sustained prolonged grief for nearly 3 yr after the parental death. Adolescents with complicated grief have higher rates of a previous history of major depressive disorder (6). In addition, complicated grief is positively correlated with functional impairment in adolescents (6). Bereaved individuals who suffer from complicated grief can also exhibit deficits in expressive flexibility (9). In particular, the recognition of emotion in adolescents is difficult due to immature expression and fluctuation (10). Therefore, noticing and recognizing the grief reaction in adolescents may be important in the prevention of mental ill-

ness. However, relatively little is known about complicated grief in adolescents compared to in adults.

Complicated grief can be reliably assessed with the Inventory of Complicated Grief (ICG) (2). The ICG was developed by Prigerson and colleagues (2) with good reliability (Cronbach's  $\alpha$  of 0.923 to 0.936) and high concurrent validity with the Beck Depression Inventory ( $r = 0.67, P < 0.001$ ). Replication studies with a large population of bereaved individuals have indicated reasonable reliability and validity of the ICG in patients with depression and PTSD (3,11). The short version of the ICG includes 15 items focusing on separation distress and traumatic distress, and has been used to assess complicated grief in patients with PTSD (12). Recently, the ICG was used to assess prolonged grief in survivors of the Great East Japan Earthquake and Tsunami (13). In that study, the ICG-Japan version was verified by exploratory factor analysis (EFA) with appropriate loading factors (0.68 to 0.90).

Based on previous studies, we aimed to verify an ICG-Korean version among 1,138 Korean adolescents to assess complicated grief in this population.

## MATERIALS AND METHODS

### Participants

Investigators had visited one middle school and one high school in Daegu and under the principal's permission, the explanation of the research purpose and informed consents had been given to the parents and students through homeroom teachers. Among 2,000 students, 1,138 (56.9%) students and their parents had consented and completed all the questions.

There were no differences in sex and age distribution between participants and non-participants. An analysis of variance (ANOVA) was performed finding no significant effect of gender on total scores of the ICG and the CDI. The mean age of the sample was not correlated with ICG-total and Children's Depression Inventory (CDI) scores. Of 1,166 students, 28 students (2.4%) were excluded due to poor data quality (more than 15% missing items). Missing data values were input using an expectation-maximization algorithm (14).

### Measures

Demographic variables including age, sex, years of education, and experience of the death and grief were collected. Participants also completed the ICG, the CDI, and the Lifetime Incidence of Traumatic Events-Child (LITE-C). The ICG is a self-report measure assessing the severity of complicated grief symptoms (2,15). Each of the 19 items is rated using a 5-point Likert scale from 0 (not at all) to 4 (severe). Internal consistency is high (Cronbach's  $\alpha = 0.94$ ) and its concurrent validity in relation to the Beck Depression Inventory is acceptable ( $r = 0.67, P < 0.001$ ) (2).

The CDI is a 27-item self-report measure assessing the severity of depressive or dysthymic symptoms in children and adolescents aged 7 to 17 years, which is corresponding to the BDI in adults (16). It assesses five areas including negative mood, interpersonal problems, ineffectiveness, anhedonia, and negative self-esteem. Its internal consistency is high (Cronbach's  $\alpha = 0.71-0.89$ ). A total CDI score of 36 or higher indicates severe depression (17).

The LITE is a checklist assessing trauma or losses that children have experienced and also assesses the age at which the trauma occurred, how many times it occurred, and how bad the child felt at that time (18). The items of the LITE include car accidents, house fires, death of a family member, exposure to threats, sexual assaults, witness to violence, and other potentially upsetting events. The test-retest reliability of the LITE is  $r = 0.80 (P < 0.001)$ . The child completes the LITE-C measure on his/her own and a clinician reviews it to rate the entire set of responses from 1 (no trauma or loss), 2 (possible trauma/loss), 3 (probable trauma/loss), and 4 (trauma/loss) (18).

### Data analysis

Initially, confirmatory factor analysis (CFA) was performed to estimate acceptable model fit (CFI and/or TLI  $> 0.90$ , root mean square error of approximation [RMSEA]  $< 0.08$ ) using AMOS (19). Because the data did not meet these criteria, an exploratory factor analysis (EFA) was used to determine whether the items on the ICG indicated complicated grief in Korean adolescents. A scree plot of the eigenvalues obtained for the emergent factors was used to show the variance in the data by each factor and the number of underlying factors present. A second analysis was performed on items that satisfied the following conditions: each factor loading  $> 0.4$ , valid percentage of answers  $> 3.0\%$ , and increasing Cronbach's  $\alpha$  coefficient obtained from the deletion of each item. Item discriminability was assessed using each item's correlation with the total score of the ICG and factor loadings.

The psychometric properties of the ICG-Korean version included internal consistency, test-retest reliability, and a validity test. Internal consistency of the ICG-Korean version was assessed with Cronbach's coefficient. Test-retest reliability was computed for a randomly selected sample of 314 students who participated in repeated assessment after 2 weeks. Concurrent validity was assessed using a correlation between the ICG total scores and the CDI total scores.

### Ethics statement

The study protocol was approved by the institutional review board of the Korea National Institute for Bioethics Policy (P01-201304-SB-12). Informed consent was confirmed by the board and obtained by the participants and their parents.

## RESULTS

### Demographic characteristics

The mean age of the 1,138 participants was  $14.7 \pm 1.6$  yr. A total of 582 (51.2%) participants reported having experienced the deaths of parents, siblings, friends, grandparents, or others. Most (95.7%) reported that they were in a middle economic state.

**Table 1.** Demographic characteristics of participants, experience of death and mean total of the CDI and the ICG

Parameters	Total (n = 1,138)	Percentage
Age (yr)	$14.7 \pm 1.6$	
Sex (M/F)	623/540	53.6/46.4
Years of education	$9.5 \pm 1.2$	
Socioeconomic status		
Low	12	1.0
Mid-low	144	12.7
Middle	648	56.9
Middle-high	296	26.1
High	38	3.3
Father, years of education	$14.8 \pm 2.4$	
Mother, years of education	$14.2 \pm 2.3$	
Death experience (yes/no)	582/556	51.2/48.8
Relation to participants		
Parents	17	2.9
Sibling	1	0.2
Friends	25	4.3
Grandparents	418	71.8
Others	121	20.8
CDI-total*	$10.1 \pm 6.9$	
ICG-total <sup>†</sup>	$2.5 \pm 6.0$	

\*CDI-total, total score on the Children's Depression Inventory; <sup>†</sup>ICG-total: total score on the Inventory of Complicated Grief.

Mean total score of the CDI was  $10.1 \pm 6.9$  and the mean total score of the ICG was  $2.5 \pm 6.0$  (Table 1). Of the 582 participants who reported experiencing a death, 403 (69.3%) reported a score higher than 1 on the LITE-C and 179 (30.7%) reported a score of 1 on the LITE-C. Based on scores on the LITE, participants were grouped into the adolescents without complicated grief (non-

**Table 2.** Descriptive statistics for each item in Korean Version of the Inventory of Complicated Grief (ICG) (n = 1,138)

Item No.		No.	%	Mean	S.D.
1	Preoccupation with the person who died	142	12.5	1.17	0.517
2	Memories of the person who died are upsetting	110	9.7	1.14	0.468
3	The death is unacceptable	138	12.1	1.19	0.599
4	Longing for the person who died	335	29.4	1.44	0.798
5	Drawn to places and things associated with the person who died	129	11.3	1.17	0.523
6	Anger about the death	47	4.1	1.07	0.377
7	Disbelief	190	16.7	1.26	0.668
8	Feeling stunned or dazed	132	11.6	1.18	0.574
9	Difficulty trusting others	44	3.9	1.06	0.313
10	Difficulty caring about others	35	3.1	1.04	0.279
11	Avoidance of reminders of the person who died	23	2.0	1.03	0.253
12	Pain in the same area of the body	60	5.3	1.09	0.419
13	Feeling that life is empty	82	7.2	1.11	0.427
14	Hearing the voice of the person who died	24	2.1	1.03	0.212
15	Seeing the person who died	16	1.4	1.02	0.161
16	Feeling it is unfair to live when the other person has died	32	2.8	1.04	0.267
17	Bitter about the death	93	8.2	1.12	0.473
18	Envious of others lonely	171	15.0	1.24	0.658
19	Lonely	59	5.2	1.09	0.437

**Table 3.** Factor loading for Korean version of the Inventory of Complicated Grief: 19 items vs. 16 items

Items No.		19 items		16 items	
		Factor loadings	Communality	Factor loadings	Communality
1	Preoccupation with the person who died	0.736	0.621	0.743	0.609
2	Memories of the person who died are upsetting	0.783	0.699	0.790	0.563
3	The death is unacceptable	0.731	0.635	0.747	0.702
4	Longing for the person who died	0.656	0.566	0.669	0.900
5	Drawn to places and things associated with the person who died	0.724	0.564	0.731	0.600
6	Anger about the death	0.664	0.495	0.660	0.445
7	Disbelief	0.722	0.665	0.736	0.735
8	Feeling stunned or dazed	0.795	0.665	0.798	0.654
9	Difficulty trusting others	0.708	0.584	0.691	0.345
10	Difficulty caring about others	0.679	0.625	0.660	0.334
11	Avoidance of reminders of the person who died	0.517	0.497	-	-
12	Pain in the same area of the body	0.711	0.589	0.700	0.507
13	Feeling that life is empty	0.651	0.442	0.650	0.489
14	Hearing the voice of the person who died	0.498	0.417	-	-
15	Seeing the person who died	0.328	0.312	-	-
16	Feeling it is unfair to live when the other person has died	0.664	0.516	0.641	0.319
17	Bitter about the death	0.702	0.570	0.706	0.568
18	Envious of others Lonely	0.651	0.528	0.667	0.768
19	Lonely	0.726	0.582	0.724	0.510
Eigenvalue		8.64		8.04	
Variance extracted (%)		45.5		50.2	

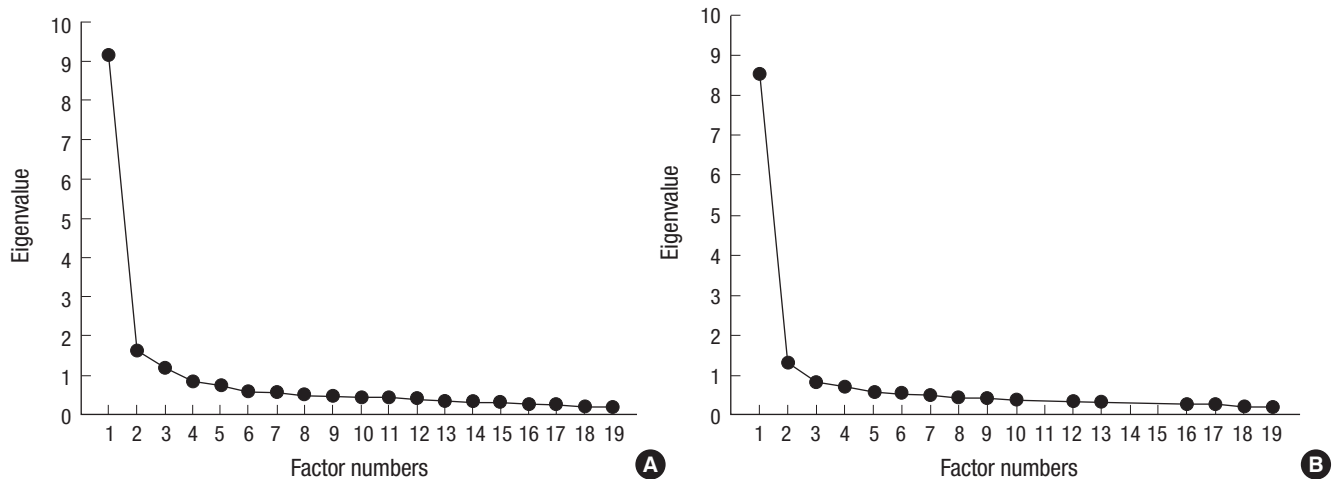


Fig. 1. Scree plots of eigenvalues (from the reduced correlation matrix) according to the number of factors. (A) 19-item ICG and (B) 16-item ICG.

CG) ( $1.2 \pm 3.7$ ) subgroup (LITE-C score = 1) or the adolescent with complicated grief (CG) subgroup (LITE-C  $\geq 2$ ). Of the 556 students who had not experienced someone else's death, 276 (49.6%) students had a score  $\geq 2$  on the LITE-C scale.

#### Reliability, validity, and descriptive statistics

The internal consistency of the ICG Korean version was high (Cronbach's  $\alpha = 0.87$ ). Test-retest reliability of the ICG Korean version was  $r = 0.75$  ( $P < 0.001$ ). Korean adolescents experienced complicated grief as a form of longing for the person who died (29.4%), disbelief (16.7%), envious of others lonely (15.0%), and preoccupation with the person who died (12.5%) (Table 2). Concurrent validity was assessed using a correlation between the ICG total scores and the CDI total scores ( $r = 0.75$ ,  $P < 0.001$ ). Criterion-related validity of the ICG-Korean version was based on the comparison of the ICG total scores between the non-CG group ( $1.2 \pm 3.7$ ) and the CG group ( $3.2 \pm 6.6$ ), which was relatively high ( $t = 5.71$ ,  $P < 0.001$ ).

#### Factor analysis

The data acquired was acceptable for factor analysis (Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.911; Bartlett's Test of Sphericity,  $\chi^2 = 13144.7$ ,  $P < 0.001$ ). Results of the exploratory analysis revealed that 18 items on the 19-item ICG-Korean version could be characterized as one factor (complicated grief). The factor loading values were acceptable (0.498-0.795) except for item 15, 'Seeing the person who died' (0.328). The scree plot further supported a single underlying construct assessing complicated grief (eigenvalue = 8.64) (Table 3), (Fig. 1).

In the second analysis, 3 items (Item 11. 'Avoidance of reminders of the person who died' with answer percentage  $< 3.0$  and increasing Cronbach  $\alpha$ ; Item 14. 'Hearing the voice of the person who died' with answer percentage  $< 3.0$  and increasing Cronbach  $\alpha$ ; Item 15. 'Seeing the person who died' with a factor loading  $< 0.4$ ) were removed. All 16 items were characterized

as one factor. Factor loading scores were high (0.650-0.798). The scree plot further supported a single underlying construct measuring complicated grief (eigenvalue = 8.04) (Fig. 1). After exclusion of these 3 items, the value of Cronbach  $\alpha$  increased from 0.87 for the 19-item ICG-Korean version to 0.93 for the 16-item ICG-Korean version (Table 3).

## DISCUSSION

Using a sample of 1,138 Korean adolescents aged 11-19 years, the current study assessed the psychometric properties of the Korean version of the ICG, including its reliability and validity. Results indicated a reasonable number of items recommending further clinical assessment. These findings suggest that the 16-item Korean version of the ICG has good internal consistency and validity compared with the standard CDI.

The internal consistency of the 19-item Korean version of the ICG was good (Cronbach's  $\alpha = 0.87$ ). The original version of the ICG also had high internal consistency (Cronbach's  $\alpha = 0.94$ ) (2). The test-retest reliability of the Korean version of the ICG ( $r = 0.75$ ,  $P < 0.001$ ) was lower than that observed in the original version of the PSC ( $r = 0.80$ ,  $P < 0.001$ ) (2). Typically, a test-retest reliability correlation value higher than 0.70 is accepted as reasonable (20). Concurrent validity using a correlation between the ICG total scores and the BDI total scores was  $r = 0.67$  ( $P < 0.001$ ) in original version and was higher in our study ( $r = 0.75$ ,  $P < 0.001$ ) (2). The criterion-related validity comparing the non-CG and CG-groups was also statistically significant.

As described in Table 2, Korean adolescents appear to experience complicated grief as forms of longing for the deceased, disbelief, loneliness, and preoccupation with thoughts about the deceased. The first step in supporting and protecting youth around the death of a family member may be in detecting the signs and symptoms of prolonged grief (21). Identifying the 4 most common factors found in the current study would aid in

detecting and managing complicated grief in adolescents in Korean society.

The Korean version of the ICG did not have a good fit in the CFA. O'Connor et al. (12) reported a good CFA model fit with an older population (60-81 yr) (CFI = 0.95 and RMSEA = 0.081). The failure to obtain a good model fit in our sample may have been due to the difference in age (11-19) from the O'Connor sample, as well as a different cultural and psychological background. On the EFA, the Korean version of the ICG achieved acceptable factor loading scores except for Item 15, 'Seeing the person who died' (0.328). Moreover, the 16-item ICG without the items about perception distortion (Item 14, 'Hearing the voice of the person who died' and Item 15 'Seeing the person who died') had a higher internal consistency compared to the ICG-19 items. These differences were likely due to 1) the different ages of participants between the original version (the recently widowed elderly) and the Korean version, 2) cultural differences in Korea, especially among adolescents, in tendency to give socially acceptable answer because Item 14 and Item 15 contain the clear psychopathology such as auditory and visual hallucinations, and 3) differences in the level of intimacy between the original version (partner) and the Korean version (grandparents) (2,22,23). For the death of the spouse, there might be more reminders of the traumatic grief in the house because they had more chance to live together than for the grandparents in our study. Like the Korean version of the ICG, Tsutsui et al. (13) used also an EFA method in the study using only 6 items extracted from ICG after the Great East Japan Earthquake and Tsunami for assessing prolonged grief. Participants were 82 employees (mean age, 45.8 yr; age range, 23-69 yr) of a public general hospital who lost at least one or more family members, relatives, friends, colleagues, or neighbors (13). This is another ICG study using an EFA fit model in Asia.

There had been few studies on prolonged grief among adolescents, especially in Korea. Suicide is the second leading cause of death among adolescents worldwide and the first cause of death among Korean adolescents. The number of suicides in Korea, especially among high school students and female students, is rapidly increasing when compared with western countries (23). There had been 250 high school students' deaths or missing after ship sinking accidents in Korea in 2014. Melhem et al. (24) reported that traumatic grief at 6 months among 146 friends and acquaintances of 26 adolescents' suicide victims in U.S.A. predicted the onset or course of depression and PTSD at subsequent 12-18, 36 months and 6 years assessments.

There were several limitations to the current research. First, the age of participants ( $14.7 \pm 1.6$  yr) differed from the original version of the ICG ( $66.9 \pm 6.2$  yr), so Korean version of the ICG may not fully reflect the meaning in entire items of original version of the ICG. Second, the participants in the current study could not be screened with a structured clinical interview. Fu-

ture studies should consider validation study among adolescents with traumatic grief after death of the parents or close friends for the 19 item ICG and the validation of 3 items with low factor loading and the cut-off score with ROC curve.

Our results indicate that the ICG may be a useful tool for screening complicated grief in Korean adolescents after death of family members or peer's death, especially after suicide. However, the 16-item ICG version appeared to have greater validity compared to the 19-item ICG version. We suggest that the 16-item ICG be used to screen complicated grief in Korean adolescents.

## DISCLOSURE

The author has no potential conflicts of interest to disclose.

## AUTHOR CONTRIBUTION

Conception and design of the work: Chung US, Moon DS, Cha MJ, Min SY. Acquisition of data: Cha MJ, Moon DS, Kim MA, Min SY, Yang JH, Lee EJ. Analysis of data: Han DH, Yoo SK, Lee JJ. Drafting the work: Chung US, Han DH, Lee JJ. Revising the content of manuscript Revision after review: Chung US, Han DH.

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