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의학석사 학위논문

응급실에 내원한 자살시도자의
하위유형 분류에 따른 특성 비교
**Classification of Korean Suicide
Attempters and Comparison of
Characteristics between Subgroups**

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ABSTRACT

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Introduction: Understanding the structure in populations of suicide attempters is essential to establish the effective suicide prevention strategies. The aim of this study was to explore subgroups among Korean suicide attempters in terms of details of the suicide attempt.

Methods: We analyzed a sample of 900 suicide attempters who were treated in the emergency room due to the suicide attempt. Rating variables concerned demographic characteristics, clinical information, and details of the suicide attempt including suicidal intent and lethality assessed by Suicide Intent Scale (SIS) and Columbia-Suicide Severity Rating Scale (C-SSRS). A cluster analysis was performed using the Ward method.

Results: Two subgroups were identified. A majority of our sample fell into a subgroup characterized by less planning, methods of low lethality and ambivalence towards death (“unplanned”). The other subgroup made more severe and well-planned attempt, using high lethal methods and taking more precautions to avoid being interrupted (“planned”). We also examined differences in demographic and clinical variables between two subgroups: the

unplanned subgroup was predominantly females and more likely to be under psychiatric treatment while the planned subgroup was associated with more males, older age, and physical illness.

Conclusions: Cluster analysis extracted two distinct subgroups of Korean suicide attempters. The understanding that a significant portion of suicide attempts in South Korea occur impulsively calls for the development of new prevention strategies tailored to different profiles of subgroups.

Keywords: suicide, suicide attempt, cluster analysis, suicide intent scale

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1. INTRODUCTION

Suicide is one of the leading causes of death in many countries, especially in South Korea (1). Suicide rates of Korea are still among the highest in the world even though they have slightly dropped down from 28.6 per 100,000 in 2013 to 26.5 per 100,000 in 2015 (2-4). Over 800,000 people worldwide die from suicide every year and there are much more who attempt suicide (5).

Suicide and attempted suicide are both complex behaviors and extensive research has been done in order to better understand, predict, and eventually prevent suicidal behavior. Numerous factors contribute to suicide and can be categorized as state-dependent or trait-dependent, or as distal or proximal factors (6). The relation between risk factors can be explained in conceptual models of suicide such as the stress-diathesis model (6, 7). It suggests that some patients have vulnerability or predisposition to suicidal behavior since suicide is not a common response to extreme stress. Diathesis for suicidal behavior includes familial or genetic factors, early traumatic life

events, personality characteristics such as impulsivity or aggression, and neurobiological disturbances (e.g. serotonin dysfunction and hypothalamic-pituitary axis hyperactivity) (6). Acute psychiatric disorders, acute medical illness, and acute psychosocial stresses are commonly the proximal or state-dependent risk factors associated with suicidal acts (7).

Another approach to understanding and preventing suicide focused on how to classify suicide attempters into relevant homogeneous groups and differentiate the individuals at greater risk among the large population of attempters (8). Within the population of suicide attempters, there are many differences not only with regard to demographic and psychosocial characteristics but with regard to lethality, motivation, and arrangement of the attempt (9). Since the publication from Tuckman and Youngman who first identified suicide risk groups among attempted suicides (10), many researchers have tried to classify suicide attempters with or without priori subgroups. The review by Arensman and Kerkhof (9) revealed that the majority of previous studies on clustering suicide attempters were based on a priori classified categories: 1) repeaters vs. non-repeaters, 2) fatal repeaters vs.

nonfatal attempters, 3) repeaters vs. first-timers, 4) serious vs. non-serious attempters. Meanwhile, few studies categorized suicide attempters without a priori subgroups and showed a consistency with regard to two subgroups that were distinguished in terms of the suicide intent scale scores and motives at the time of the attempt, whether self-directed or directed toward others (9). A study on patients who made a serious suicide attempt and were consequently admitted to a general hospital identified 3 groups regarding lethality of suicide attempt and suicidal intent (11). More recently, another study on a sample of hospitalized suicide attempters suggested 3 distinct clusters: impulsive-ambivalent, well-planned, or frequent (8). These two studies, however, were limited only to suicide attempters who were admitted to a hospital after the suicide attempt, which means more severe cases among all cases of attempted suicide. Moreover, to our knowledge, there was no study that tried to classify Korean suicide attempters into homogeneous subgroups using a systematic statistical approach. If they have different characteristics and take on different paths to suicide, the prevention strategies must be different from one subgroup to another.

Therefore, the aim of this study is to identify distinct subgroups among Korean suicide attempters for establishing effective suicide prevention strategies. We used two scales that assess suicidal intent and suicidal behavior, all items of the Suicide Intent Scale (SIS) and two subscales of Columbia Suicide Severity Rating Scale (C-SSRS), for clustering. It was also investigated if there was any difference in sociodemographic and clinical variables between subgroups that could help characterize them.

2. METHODS

2.1. Study Sample

The study was a secondary analysis from a previous nationwide survey of attempted suicide in Korea, the Korean National Suicide Study (KNSS), which recruited 1,359 cases of suicide attempts who visited emergency department of 17 medical centers from May to November 2013. Seventeen hospitals across the country were selected so that our sample would be representative of an entire population. Patients were excluded if (a) they were dead on arrival, (b) they were unable to interview because of a language barrier or any other reason or (c) they did self-injurious behavior without obvious suicidal intent. Trained psychiatrists interviewed all patients. This study was approved by the Institutional Review Board of each hospital.

From the initial sample, 459 participants were excluded due to missing values in at least one of the SIS items or C-SSRS items, yielding a total of 900 cases for this analysis.

2.2. Assessment

Suicidal behavior was assessed using the Beck Suicide Intent Scale (SIS) (12) and Columbia-Suicide Severity Rating Scale (C-SSRS) (13). The SIS is a 15-item ordinal scale that assesses the intent to die of the suicidal attempt, each item ranging from 0 to 2. These items included isolation, timing, precautions against discovery or intervention, acting to get help during attempt, final acts in anticipation of death, active preparation for attempt, suicide note, overt communication of intent before the attempt, alleged purpose of attempt, expectations of fatality, conception of method's lethality, seriousness of attempt, attitude toward living/dying, conception of medical rescuability, and degree of premeditation. The first 8 items are relevant to the objective circumstances of the suicidal attempt while the last 7 items explore the subjective thoughts and feelings of the patient at the moment of the attempt (8).

The C-SSRS is a semi-structured, rater-based interview to assess the severity and intensity of suicidal ideation and behaviors (14). The intensity of ideation subscale consists of 5 questions about the frequency, duration, controllability, deterrents, and reasons for ideation, each rated on a 5-point

ordinal scale. The total score ranges from 2 to 25, with a higher number indicating more intense ideation and greater risk. The actual lethality of suicidal behavior (lethality subscale) inquires about the level of actual medical damage or potential for it: from 0 (no physical damage) to 5 (death). Greater lethality of the behavior indicates increased risk.

Socio-demographic data were collected about age, gender, marital status, employment status, educational level, type of insurance, and urbanicity. Subjects were grouped into three marital status categories which included never married, currently married or cohabitating, and previously married (including those who were separated, divorced, or widowed). The employment status was categorized into three groups: employed, homemaker or student, unemployed. The level of education was divided into less than high school, high school graduate, and college graduate. Dichotomous variables were used for the type of insurance, and urbanicity.

Mental and physical conditions of participants were explored as well. The final psychiatric diagnosis was assessed using the Diagnostic and Statistical Manual of Mental Disorder, fourth edition, text revision DSM-IV-

TR (15). Methods of the suicide attempt were dichotomized in terms of lethality. Methods of low lethality were defined as drug overdose and use of a sharp object while methods of high lethality included all other methods, including hanging, drowning, jumping from a height, immolation, use of a firearm, intentional pesticide poisoning, etc (16-19).

2.3. Statistical Analyses

The responses to the 15 items of SIS were considered as categorical variables respectively, while the intensity of ideation subscale and lethality subscale from C-SSRS were treated as continuous variables. Before clustering, we performed a multiple correspondence analysis (MCA) to transform categorical variables into quantitative information. Then we used Ward's clustering method to identify subgroups of patients and the Cubic clustering criterion (CCC), pseudo F statistic and pseudo t-squared statistic were used jointly to select the adequate number of clusters (20). Phenotypic profiles of each subgroup were compared using Kruskal-Wallis test or Wilcoxon rank sum test for continuous variables and Chi-square test for categorical variables.

Post-hoc analyses were performed using Hochberg's procedure to control for type I error. Statistical analyses were performed using SAS software, version 9.4.

3. RESULTS

3.1. Cluster analysis

From the MCA analysis, a two-dimension MCA solution was considered the most adequate. The first dimension accounted for 17.35% of the variance in the data and the second for 9.22%, yielding a total variance of 26.57%. Figure 1 displays the MCA plot with dimension 1 on the horizontal axis and dimension 2 on the vertical axis. Two MCA dimensions and intensity of ideation subscale and lethality subscale from C-SSRS were entered into the cluster analysis. When plotting the CCC, pseudo F statistic, and pseudo t-squared statistic against the number of clusters, the optimal number of clusters was considered to be two or three (Figure 2).

As shown in Table 1, when classifications based on the three-cluster solution were obtained, there were significant differences between the clusters in all variables used for the clustering ($p < 0.0001$). One subgroup of patients (19.2%) reported higher scores on the items of SIS and C-SSRS subscales, whereas another subgroup (25.4%) reported relatively low scores: the largest subgroup (55.3%) showed an intermediate pattern between the former two

subgroups.

Table 2 summarizes the demographic and clinical characteristics for the total sample and for the three subgroups. Statistical differences were found among the three subgroups in age ($p=0.0001$), gender ($p=0.0001$), marital status ($p=0.026$), employment ($p=0.0306$), physical illness ($p=0.0011$), history of psychiatric treatment ($p=0.0139$), methods of suicidal attempt ($p<0.0001$), and psychiatric diagnosis ($p=0.0314$). However, post-hoc tests revealed that the second and third subgroup barely differed in terms of demographic and clinical variables except for the methods of suicidal attempt ($p=0.03072$), which makes it difficult to differentiate those two subgroups in clinical settings (Table 3).

When classification on the two-cluster solution was obtained, the first subgroup with high scores remained intact and the last two subgroups, which turned out to be hardly distinguishable from each other by post-hoc analysis of the three-cluster solution, were merged into one subgroup. Therefore, we concluded that the two-cluster solution would be more representative of the clinical presentation of suicidal attempters and thus clinically more useful

than the three-cluster solution. Figure 3 shows the scatter plot of the two-cluster solution

3.2. Demographic and clinical characteristics of all subjects

Table 4 summarizes the demographic and clinical characteristics for the total sample and for the two subgroups. The study sample comprised 900 suicide attempters who had a complete record of the SIS and C-SSRS. They had a mean age of 42.83 years, women being more prevalent than men (60.44% vs. 39.56%). Approximately a quarter of the sample was suffering from physical illness at the moment of suicide attempt (n=239, 27.01%). Slightly more than half answered that they had a previous history of mental illness (n=469, 52.99%), 47.8% currently receiving psychiatric treatment. The most common psychiatric diagnoses were depression and adjustment disorders (n=708, 78.67%), followed by substance use disorders and others (n=90, 10.0%).

3.3. Two subgroups: planned versus unplanned

Table 5 shows the distributions of response to each SIS item and scores of C-SSRS subscales for the total sample and the two subgroups. There were significant differences between two subgroups in all items of SIS and subscales of C-SSRS used for clustering ($p < 0.0001$).

3.3.1. Subgroup 1: planned subgroup

Patients in the planned subgroup, 19.22% of the total sample, demonstrated higher scores of the intensity of ideation subscale as well as lethality subscale compared with the other subgroup. The majority of them made an attempt when no one was nearby or in visual or vocal contact (71.10%) and took precautions against discovery or intervention (passive precautions, 33.53%; active precautions, 23.70%), thus making intervention unlikely (not likely, 53.18%; highly unlikely, 31.21%). In addition, about two-thirds of this subgroup made an active preparation for the attempt and contemplated for more than three hours before the attempt. The main purpose of suicide attempt for this group was to escape, surcease and solve their problems (71.68%). Around fifty-five percent chose what s/he thought would

be lethal as a method of attempted suicide, expecting that they could possibly or probably die by the attempt.

3.3.2. Subgroup 2: unplanned subgroup

Most individuals in the unplanned subgroup did not seriously attempt suicide or were uncertain about the seriousness of their attempt to end life: half of them bearing both components of wanting to die and not wanting to die at the moment of the suicide attempt. Only a few were certain of death by the attempt (3.03%). Two thirds of the subgroup made no preparation before the attempt and, furthermore, around half of the subgroup contemplated suicide less than 3 hours; this subgroup might be named “unplanned”. A substantial proportion of this group, 18.84% of them, made a suicide attempt to manipulate the environment, get attention, and/or get revenge.

3.3.3. Sociodemographic and clinical profiles of the subgroups

The average age of the planned subgroup was 47.47 years, which is approximately 6 years higher than that of unplanned subgroup ($p=0.0001$).

Male attempters made up a slightly larger portion of the planned subgroup while women were predominant among the unplanned subgroup ($p=0.0001$). The rate of familial history of suicide in the unplanned subgroup was almost twice as high as that in the other subgroup, although statistical significance was not reached ($p=0.1305$). More individuals of the planned subgroup were suffering from a physical illness compared with the unplanned subgroup (38.24% vs. 24.34%, $p=0.0002$). Although there was no difference in the rate of the previous history of psychiatric illness between two subgroups ($p=0.9313$), attempters of the unplanned subgroup were more likely to receive psychiatric treatment at the moment ($p=0.012$) and to use methods of low lethality ($p<0.0001$). No significant differences between subgroups were found for the proportion of prior history of suicide attempts and the distribution of psychiatric diagnoses.

4. DISCUSSION

In this study, we investigated subtypes of suicide attempters who visited the emergency department after the suicide attempt using cluster analysis based on suicide intent and suicide behavior of the individuals. Cluster analysis resulted in two distinct subgroups of Korean suicide attempters: ‘planned’ versus ‘unplanned’.

Subgroup 1 composed mainly of “planned” attempters, who were more determined to commit suicide, made more preparations for the attempt, used high lethal methods, and prevented others from detecting and intervening their suicide. As most data support that greater planning is associated with higher lethality, their attempts were more medically lethal (C-SSRS lethality subscale) (21-24). Subgroup 2 represented “unplanned” type of suicide attempters. Their attempts were less premeditated and they were uncertain of their wish to die. The two-cluster solution selected in this study are consistent with two subgroups, described by Chen et al., in terms of the circumstances of the suicidal act or completed suicide: the first group was associated with

lower expressed intent and preparation to result in lower overall SIS score; the second group exhibited more expressed suicidal deliberation and higher overall SIS scores (25). They are also similar to planned versus unplanned suicidal behavior from Conner's review in 2004 (26).

In contrast, there are several reports suggesting three clusters among suicide attempters: the first, showing less risk to life, made an impulsive-ambivalent attempt; the second made more severe and well-planned attempt with more self-destructive motivation; and the third group, though few, had a history of frequent attempts (8, 27). Considering that the third group is distinguished by early onset and high number of attempts, high levels of harm avoidance and history of childhood maltreatment, the choice of variables included in the cluster analysis may have contributed to the difference with our results: we focused on the details of current attempt in this study, rather than the personality traits or previous history of attempters (8).

The planned subgroup consisted of more male and their average age was older compared with the unplanned subgroup, which is in line with the previous finding that among suicide attempters greater planning is associated

with male gender and older age (24, 26, 28). However, a multi-site study of attempted suicide in Europe sponsored by the World Health Organization (WHO) suggested that there were no meaningful age- or gender-related differences in planning of attempts (29).

Both physical and psychiatric illnesses are also considered to be significant risk factors for suicide (30). Significantly more attempters from the planned subgroup were physically ill than the unplanned subgroup when they made the suicide attempt. Though relatively little research has been done regarding the association between physical illness and subtype of suicidal behavior, there is plenty of evidence that a range of specific physical illnesses and general physical ill health are associated with an increased risk of suicide (31-34). On the other hand, in terms of psychiatric illness, more individuals in the unplanned subgroup were receiving psychiatric treatment while about two-thirds of planned attempters were never or previously treated. This is similar to the finding of Chen et al. who examined cases of completed suicide in Hong Kong using cluster analysis (25).

Major strengths of this study include its coverage of all suicidal

attempters who were treated in the emergency department after their attempt regardless of whether they were to be hospitalized or not, thus making the results more generalizable. In addition, it validated by means of cluster analysis the recent finding that a considerable proportion of suicide attempts occurring in Korea were made impulsively, suggested by Lim, Lee, and Park (35). The existence of unplanned subgroup among suicide attempters, in contrary to a widely accepted hypothesis that suicidality develops along a continuum from death wishes to suicide planning, eventually ending up with suicide attempts or completed suicides, calls for a new concept of suicide prevention strategy (36).

The present study also has a few limitations. First, although we tried to ensure a representative sample of the entire Korean population, 17 medical centers included in this study were university hospitals mostly located in urban areas. In addition, those who did not visit the emergency room of university hospitals after attempting suicide were inevitably excluded according to our study design. Second, as participants were assessed in the emergency room, an in-depth interview might not have been available in some

cases. Third, the final diagnosis of suicide attempters was made not using the structured diagnostic tool such as the Structural Clinical Interview for DSM-IV-TR or the Mini-International Neuropsychiatric Interview (MINI) but based on one psychiatrist's decision.

In conclusion, this study presents the identification of subgroups among Korean suicide attempters based on cluster analysis. We found 2 distinct subgroups of individuals, unplanned and planned subgroup, whose demographic and clinical profiles were quite different. Our finding indicates that a significant portion of suicide attempts in South Korea occur with little planning or forewarning, in contrary to a traditional concept that suicidality develops along a continuum. Further studies are needed to confirm the findings of this study. In particular, research will need to focus on the way to decide to which subgroup each subject belongs when a suicide attempter visits the emergency room or outpatient clinic and on new prevention strategies tailored to different profiles of subgroups.

References

1. OECD. Health at a Glance 2015: OECD Publishing.
2. World Health Organization. World health statistics 2016: monitoring health for the SDGs, sustainable development goals 2016.
3. Statistics Korea. Death and Cause of Death in Korea. Daejeon: Korean National Statistics Office; 2013.
4. Statistics Korea. Death and Cause of Death in Korea. Daejeon: Korean National Statistics Office; 2015.
5. World Health Organization. Preventing suicide: a global imperative: World Health Organization; 2014.
6. Hawton K, van Heeringen K. Suicide. *Lancet*. 2009;373(9672):1372-81.
7. Mann JJ. The neurobiology of suicide. *Nat Med*. 1998;4(1):25-30.
8. Lopez-Castroman J, Nogue E, Guillaume S, Picot MC, Courtet P. Clustering Suicide Attempters: Impulsive-Ambivalent, Well-Planned, or Frequent. *J Clin Psychiatry*. 2016;77(6):e711-8.
9. Arensman E, Kerkhof JF. Classification of attempted suicide: a review of empirical studies, 1963-1993. *Suicide Life Threat Behav*. 1996;26(1):46-67.
10. Tuckman J, Youngman WF. Identifying Suicide Risk Groups among Attempted Suicides. *Public Health Rep*. 1963;78:763-6.
11. Rapeli CB, Botega NJ. Clinical profiles of serious suicide attempters consecutively admitted to a university-based hospital: a cluster analysis study. *Rev Bras Psiquiatr*. 2005;27(4):285-9.
12. Beck RW, Morris JB, Beck AT. Cross-validation of the Suicidal Intent Scale. *Psychol Rep*. 1974;34(2):445-6.
13. Posner K, Brown GK, Stanley B, Brent DA, Yershova KV, Oquendo MA, et al. The Columbia-Suicide Severity Rating Scale: initial validity and internal consistency findings from three multisite studies with adolescents and adults. *Am J Psychiatry*. 2011;168(12):1266-77.
14. Mundt JC, Greist JH, Jefferson JW, Federico M, Mann JJ, Posner K. Prediction of suicidal behavior in clinical research by lifetime suicidal ideation and

behavior ascertained by the electronic Columbia-Suicide Severity Rating Scale. *J Clin Psychiatry*. 2013;74(9):887-93.

15. Association AP. Diagnostic and statistical manual of mental disorders DSM-IV-TR fourth edition (text revision). 2000.

16. Chen VC-H, Cheng AT, Tan HK, Chen C-Y, Chen TH, Stewart R, et al. A community-based study of case fatality proportion among those who carry out suicide acts. *Social psychiatry and psychiatric epidemiology*. 2009;44(12):1005-11.

17. Huang YC, Wu YW, Chen CK, Wang LJ. Methods of suicide predict the risks and method-switching of subsequent suicide attempts: a community cohort study in Taiwan. *Neuropsychiatr Dis Treat*. 2014;10:711-8.

18. Lee CY, Wu YW, Chen CK, Wang LJ. The rate of fatality and demographic characteristics associated with various suicide methods: a community-based study in Northern Taiwan. *Crisis*. 2014;35(4):245-52.

19. Miller M, Azrael D, Hemenway D. The epidemiology of case fatality rates for suicide in the northeast. *Ann Emerg Med*. 2004;43(6):723-30.

20. Ward Jr JH. Hierarchical grouping to optimize an objective function. *Journal of the American statistical association*. 1963;58(301):236-44.

21. Baca-Garcia E, Diaz-Sastre C, Basurte E, Prieto R, Ceverino A, Saiz-Ruiz J, et al. A prospective study of the paradoxical relationship between impulsivity and lethality of suicide attempts. *J Clin Psychiatry*. 2001;62(7):560-4.

22. Brent DA. Correlates of the medical lethality of suicide attempts in children and adolescents. *J Am Acad Child Adolesc Psychiatry*. 1987;26(1):87-91.

23. Brent DA, Perper JA, Goldstein CE, Kolko DJ, Allan MJ, Allman CJ, et al. Risk factors for adolescent suicide. A comparison of adolescent suicide victims with suicidal inpatients. *Arch Gen Psychiatry*. 1988;45(6):581-8.

24. Hamdi E, Amin Y, Mattar T. Clinical correlates of intent in attempted suicide. *Acta Psychiatr Scand*. 1991;83(5):406-11.

25. Chen EY, Chan WS, Chan SS, Liu KY, Chan CL, Wong PW, et al. A cluster analysis of the circumstances of death in suicides in Hong Kong. *Suicide Life Threat Behav*. 2007;37(5):576-84.

26. Conner KR. A call for research on planned vs. unplanned suicidal behavior. *Suicide Life Threat Behav*. 2004;34(2):89-98.

27. Paykel ES, Rassaby E. Classification of suicide attempters by cluster

- analysis. *Br J Psychiatry*. 1978;133:45-52.
28. Weyrauch KF, Roy-Byrne P, Katon W, Wilson L. Stressful life events and impulsiveness in failed suicide. *Suicide Life Threat Behav*. 2001;31(3):311-9.
 29. Hjelmeland H, Nordvik H, Bille-Brahe U, De Leo D, Kerkhof JF, Lonnqvist J, et al. A cross-cultural study of suicide intent in parasuicide patients. *Suicide Life Threat Behav*. 2000;30(4):295-303.
 30. Qin P, Hawton K, Mortensen PB, Webb R. Combined effects of physical illness and comorbid psychiatric disorder on risk of suicide in a national population study. *Br J Psychiatry*. 2014;204(6):430-5.
 31. Allebeck P, Bolund C, Ringback G. Increased suicide rate in cancer patients. A cohort study based on the Swedish Cancer-Environment Register. *J Clin Epidemiol*. 1989;42(7):611-6.
 32. Bronnum-Hansen H, Stenager E, Nylev Stenager E, Koch-Henriksen N. Suicide among Danes with multiple sclerosis. *J Neurol Neurosurg Psychiatry*. 2005;76(10):1457-9.
 33. Larsen KK, Agerbo E, Christensen B, Sondergaard J, Vestergaard M. Myocardial infarction and risk of suicide: a population-based case-control study. *Circulation*. 2010;122(23):2388-93.
 34. Qin P, Mortensen PB, Waltoft BL, Postolache TT. Allergy is associated with suicide completion with a possible mediating role of mood disorder - a population-based study. *Allergy*. 2011;66(5):658-64.
 35. Lim M, Lee S, Park J-I. Differences between Impulsive and Non-Impulsive Suicide Attempts among Individuals Treated in Emergency Rooms of South Korea.
 36. Sveticic J, De Leo D. The hypothesis of a continuum in suicidality: a discussion on its validity and practical implications. *Ment Illn*. 2012;4(2):e15.

Table 1. Comparison of suicide intent scale and Columbia suicide severity rating scale scores for subgroups with the three cluster solution

	Total (n=900)	Subgroup 1 (n=173)	Subgroup 2 (n=498)	Subgroup 3 (n=229)	<i>p</i> value
C-SSRS, mean (SD)					
Intensity of ideation subscale	14.04 (3.42)	16.01 (3.16)	14.25 (3.04)	12.07 (3.38)	<0.0001
Lethality subscale	1.57 (1.02)	2.89 (0.70)	1.29 (0.78)	1.18 (0.84)	<0.0001
SIS, n (%)					
Isolation (item 1)					
Somebody present	201 (22.33)	20 (11.56)	81 (16.27)	100 (43.67)	
Somebody nearby, or in visual or vocal contact	190 (21.11)	30 (17.34)	117 (23.49)	43 (18.78)	<0.0001
No one nearby or in visual or vocal contact	509 (56.56)	123 (71.10)	300 (60.24)	86 (37.55)	
Timing (item 2)					
Intervention is probable	390 (43.33)	27 (15.61)	191 (38.35)	172 (75.11)	
Intervention is not likely	409 (45.44)	92 (53.18)	267 (53.61)	50 (21.83)	<0.0001
Intervention is highly unlikely	101 (11.22)	54 (31.21)	40 (8.03)	7 (3.06)	
Precautions against discovery/intervention (item 3)					
No precautions	520 (57.78)	74 (42.77)	251 (50.40)	195 (85.15)	
Passive precautions	300 (33.33)	58 (33.53)	210 (42.17)	32 (13.97)	<0.0001
Active precautions	80 (8.89)	41 (23.70)	37 (7.43)	2 (0.87)	

Acting to get help during/after attempt (item 4)					
Notified potential helper regarding attempt	349 (38.78)	19 (10.98)	205 (41.16)	125 (54.59)	
Contacted but did not specifically notify potential helper regarding attempt	87 (9.67)	22 (12.72)	55 (11.04)	10 (4.37)	<0.0001
Did not contact or notify potential helper	464 (51.56)	132 (76.30)	238 (47.79)	94 (41.05)	
Final acts in anticipation of death (item 5)					
None	627 (69.67)	93 (53.76)	319 (64.06)	215 (93.89)	
Thought about or made some arrangements	211 (23.44)	52 (30.06)	148 (29.72)	11 (4.80)	<0.0001
Made definite plans or completed arrangements	62 (6.89)	28 (16.18)	31 (6.22)	3 (1.31)	
Active preparation for attempt (item 6)					
None	543 (60.33)	62 (35.84)	281 (56.43)	200 (87.34)	
Minimal to moderate	309 (34.33)	80 (46.24)	200 (40.16)	29 (12.66)	<0.0001
Extensive	48 (5.33)	31 (17.92)	17 (3.41)	0 (0.00)	
Suicide note (item 7)					
Absence of note	782 (86.89)	145 (83.82)	415 (83.33)	222 (96.94)	
Note written, but torn up; note thought about	48 (5.33)	11 (6.36)	35 (7.03)	2 (0.87)	<0.0001
Presence of note	70 (7.78)	17 (9.83)	48 (9.64)	5 (2.18)	
Overt communication of intent before the attempt (item 8)					
None	361 (40.11)	64 (36.99)	167 (33.53)	130 (56.77)	<0.0001

Equivocal communication	370 (41.11)	78 (45.09)	226 (45.38)	66 (28.82)	
Unequivocal communication	169 (18.78)	31 (17.92)	105 (21.08)	33 (14.41)	
Alleged purpose of attempt (item 9)					
To manipulate environment, get attention, get revenge	139 (15.44)	2 (1.16)	71 (14.26)	66 (28.82)	
Components of above and below	398 (44.22)	47 (27.17)	243 (48.80)	108 (47.16)	<0.0001
To escape, surcease, solve problems	363 (40.33)	124 (71.68)	184 (36.95)	55 (24.02)	
Expectations of fatality (item 10)					
Thought that death was unlikely	210 (23.33)	2 (1.16)	38 (7.63)	170 (74.24)	
Thought that death was possible but not probable	463 (51.44)	37 (21.39)	370 (74.30)	56 (24.45)	<0.0001
Thought that death was probable or certain	227 (25.22)	134 (77.46)	90 (18.07)	3 (1.31)	
Conception of method's lethality (item 11)					
Did less to self than s/he thought would be lethal	233 (25.89)	8 (4.62)	57 (11.45)	168 (73.36)	
Wasn't sure if what s/he did would be lethal	529 (58.78)	69 (39.88)	405 (81.33)	55 (24.02)	<0.0001
Equaled or exceeded what s/he thought would be lethal	138 (15.33)	96 (55.49)	36 (7.23)	6 (2.62)	
Seriousness of attempt (item 12)					
Did not seriously attempt to end life	213 (23.67)	1 (0.58)	43 (8.63)	169 (73.80)	
Uncertain about seriousness to end life	428 (47.56)	41 (23.70)	338 (67.87)	49 (21.40)	<0.0001
Seriously attempted to end life	259 (28.78)	131 (75.72)	117 (23.49)	11 (4.80)	
Attitude toward living/dying (item 13)					

Did not want to die	111 (12.33)	3 (1.73)	31 (6.22)	77 (33.62)	
Components of above and below	396 (44)	31 (17.92)	255 (51.20)	110 (48.03)	<0.0001
Wanted to die	393 (43.67)	139 (80.35)	212 (42.57)	42 (18.34)	
Conception of medical rescuability (item 14)					
Thought that death would be unlikely if he received medical attention	306 (34)	7 (4.05)	105 (21.08)	194 (84.72)	
Was uncertain whether death could be averted by medical attention	504 (56)	98 (56.65)	371 (74.50)	35 (15.28)	<0.0001
Was certain of death even if he received medical attention	90 (10)	68 (39.31)	22 (4.42)	0 (0.00)	
Degree of premeditation (item 15)					
None	390 (43.33)	28 (16.18)	173 (34.74)	189 (82.53)	
Suicide contemplated for three hours of less prior to attempt	263 (29.22)	41 (23.70)	195 (39.16)	27 (11.79)	<0.0001
Suicide contemplated for more than three hours prior to attempt	247 (27.44)	104 (60.12)	130 (26.10)	13 (5.68)	

Text in **Bold** means p -value <0.05

Table 2. Demographic and clinical characteristics of the total sample and differences among three subgroups

	Total (n=900)	Subgroup 1 (n=173)	Subgroup 2 (n=498)	Subgroup 3 (n=229)	<i>p</i> value
Age, mean(SD)	42.83 (18.01)	47.47 (18.40)	42.43 (17.26)	40.19 (18.70)	0.0001
Gender, n (%)					
Male	356 (39.56)	91 (52.60)	191 (38.35)	74 (32.31)	0.0001
Female	544 (60.44)	82 (47.40)	307 (61.65)	155 (67.69)	
Marital status, n(%)					
Never married	308 (34.53)	46 (27.06)	176 (35.63)	86 (37.72)	0.0260
Married/ cohabitating	425 (47.65)	97 (57.06)	219 (44.33)	109 (47.81)	
Previously married	159 (17.83)	27 (15.88)	99 (20.04)	33 (14.47)	
Employment status, n(%)					
Employed	401 (45.01)	75 (44.12)	237 (48.07)	89 (39.04)	0.0306
Homemaker, student	239 (26.82)	37 (21.76)	127 (25.76)	75 (32.89)	
Unemployed	251 (28.17)	58 (34.12)	129 (26.17)	64 (28.07)	
Education, n(%)					
Less than high school	288 (34.12)	63 (39.87)	144 (30.70)	81 (37.33)	0.1620
High school graduates	413 (48.93)	74 (46.84)	238 (50.75)	101 (46.54)	
College graduates	143 (16.94)	21 (13.29)	87 (18.55)	35 (16.13)	

Type of insurance, n(%)					
National Health Insurance	746 (92.33)	140 (89.74)	415 (92.02)	191 (95.02)	0.1657
Medical aid	62 (7.67)	16 (10.26)	36 (7.98)	10 (4.98)	
Region, n(%)					
Urban area	751 (86.12)	136 (81.44)	424 (87.42)	191 (86.82)	0.1464
Rural area	121 (13.88)	31 (18.56)	61 (12.58)	29 (13.18)	
Familial history of suicide, n(%)					
No	790 (92.29)	156 (95.12)	431 (91.51)	203 (91.86)	0.3147
Yes	66 (7.71)	8 (4.88)	40 (8.49)	18 (8.14)	
Physical illness, n(%)					
No	646 (72.99)	105 (61.76)	374 (76.02)	167 (74.89)	0.0011
Yes	239 (27.01)	65 (38.24)	118 (23.98)	56 (25.11)	
Previous history of psychiatric illness, n(%)					
No	416 (47.01)	79 (47.31)	237 (48.27)	100 (44.05)	0.5726
Yes	469 (52.99)	88 (52.69)	254 (51.73)	127 (55.95)	
History of psychiatric treatment, n(%)					
Never treated	217 (34.12)	51 (40.16)	120 (34.48)	46 (28.57)	0.0139
Currently under treatment	304 (47.80)	46 (36.22)	177 (50.86)	81 (50.31)	
Previously treated	115 (18.08)	30 (23.62)	51 (14.66)	34 (21.12)	

Prior suicide attempt, n(%)					
No	548 (63.57)	99 (62.66)	310 (64.45)	139 (62.33)	0.8332
Yes	314 (36.43)	59 (37.34)	171 (35.55)	84 (37.67)	
Method of the suicide attempt, n(%)					
Low lethality	639 (71.56)	82 (48.24)	365 (73.44)	192 (84.96)	<0.0001
High lethality	254 (28.44)	88 (51.76)	132 (26.56)	34 (15.04)	
Final diagnosis by DSM-IV-TR, n(%)					
Depression, adjustment disorder	708 (78.67)	141 (81.50)	397 (79.72)	170 (74.24)	0.0314
Bipolar disorder	66 (7.33)	10 (5.78)	43 (8.63)	13 (5.68)	
Schizophrenia and other psychotic disorders	36 (4.00)	9 (5.20)	16 (3.21)	11 (4.80)	
Substance use disorders and others	90 (10.00)	13 (7.51)	42 (8.43)	35 (15.28)	

Text in **Bold** means p -value <0.05

Table 3. Results of the post-hoc test for the three-cluster solution

	Adjusted <i>p</i> value		
	1-2	1-3	2-3
Age	0.05336	0.0044	0.95492
Gender	0.05029	0.00224	0.95492
Marital status	0.6516	0.95492	0.95492
Employment	0.95492	0.95492	0.95492
Education	0.95492	0.95492	0.95492
Type of insurance	0.95492	0.95492	0.95492
Region	0.95492	0.95492	0.95492
Family history of suicide	0.95492	0.95492	0.95492
Physical illness	0.01768	0.23056	0.95492
Previous history of psychiatric illness	0.95492	0.95492	0.95492
History of psychiatric treatment	0.37797	0.95492	0.95492
Method of the suicide attempt	<0.0001	<0.0001	0.03072
Final diagnosis by DSM-IV-TR	0.95492	0.95492	0.63222

Text in **Bold** means *p*-value <0.05

Table 4. Demographic and clinical characteristics of the total sample and differences between the two subgroups

	Total (n=900)	Subgroup 1 (n=173)	Subgroup 2 (n=727)	<i>p</i> value
Age, mean(SD)	42.83 (18.01)	47.47 (18.4)	41.72 (17.75)	0.0001
Gender, n (%)				
Male	356 (39.56)	91 (52.6)	265 (36.45)	0.0001
Female	544 (60.44)	82 (47.4)	462 (63.55)	
Marital status, n(%)				
Never married	308 (34.53)	46 (27.06)	262 (36.29)	0.0208
Married/ cohabitating	425 (47.65)	97 (57.06)	328 (45.43)	
Previously married	159 (17.83)	27 (15.88)	132 (18.28)	
Employment status, n(%)				
Employed	401 (45.01)	75 (44.12)	326 (45.21)	0.0964
Homemaker, student	239 (26.82)	37 (21.76)	202 (28.02)	
Unemployed	251 (28.17)	58 (34.12)	193 (26.77)	
Education, n(%)				
Less than high school	288 (34.12)	63 (39.87)	225 (32.8)	0.1662
High school graduates	413 (48.93)	74 (46.84)	339 (49.42)	
College graduates	143 (16.94)	21 (13.29)	122 (17.78)	

Type of insurance, n(%)				
National Health Insurance	746 (92.33)	140 (89.74)	606 (92.94)	0.1772
Medical aid	62 (7.67)	16 (10.26)	46 (7.06)	
Region, n(%)				
Urban area	751 (86.12)	136 (81.44)	615 (87.23)	0.0514
Rural area	121 (13.88)	31 (18.56)	90 (12.77)	
Familial history of suicide, n(%)				
No	790 (92.29)	156 (95.12)	634 (91.62)	0.1305
Yes	66 (7.71)	8 (4.88)	58 (8.38)	
Physical illness, n(%)				
No	646 (72.99)	105 (61.76)	541 (75.66)	0.0002
Yes	239 (27.01)	65 (38.24)	174 (24.34)	
Previous history of psychiatric illness, n(%)				
No	416 (47.01)	79 (47.31)	337 (46.94)	0.9313
Yes	469 (52.99)	88 (52.69)	381 (53.06)	
History of psychiatric treatment, n(%)				
Never treated	217 (34.12)	51 (40.16)	166 (32.61)	0.012
Currently under treatment	304 (47.8)	46 (36.22)	258 (50.69)	
Previously treated	115 (18.08)	30 (23.62)	85 (16.7)	

Prior suicide attempt, n(%)				
No	548 (63.57)	99 (62.66)	449 (63.78)	0.7915
Yes	314 (36.43)	59 (37.35)	255 (36.22)	
Method of the suicide attempt, n(%)				
Low lethality	639 (71.56)	82 (48.24)	557 (77.04)	<0.0001
High lethality	254 (28.44)	88 (51.76)	166 (22.96)	
Final diagnosis by DSM-IV-TR, n(%)				
Depression, adjustment disorder	708 (78.67)	141 (81.5)	567 (77.99)	0.3885
Bipolar disorder	66 (7.33)	10 (5.78)	56 (7.7)	
Schizophrenia and other psychotic disorders	36 (4.0)	9 (5.2)	27 (3.71)	
Substance use disorders and others	90 (10.0)	13 (7.51)	77 (10.59)	

Text in **Bold** means p -value <0.05

Table 5. Comparison of suicide intent scale and Columbia suicide severity rating scale scores for the two subgroups

	Total (n=900)	Subgroup 1 (n=173)	Subgroup 2 (n=727)	<i>p</i> value
C-SSRS, mean (SD)				
Intensity of ideation subscale	14.04 (3.42)	16.01 (3.16)	13.57 (3.31)	<0.0001
Lethality subscale	1.57 (1.02)	2.89 (0.7)	1.25 (0.8)	<0.0001
SIS, n (%)				
Isolation (item 1)				
Somebody present	201 (22.33)	20 (11.56)	181 (24.9)	
Somebody nearby, or in visual or vocal contact	190 (21.11)	30 (17.34)	160 (22.01)	<0.0001
No one nearby or in visual or vocal contact	509 (56.56)	123 (71.1)	386 (53.09)	
Timing (item 2)				
Intervention is probable	390 (43.33)	27 (15.61)	363 (49.93)	
Intervention is not likely	409 (45.44)	92 (53.18)	317 (43.6)	<0.0001
Intervention is highly unlikely	101 (11.22)	54 (31.21)	47 (6.46)	
Precautions against discovery/intervention (item 3)				
No precautions	520 (57.78)	74 (42.77)	446 (61.35)	
Passive precautions	300 (33.33)	58 (33.53)	242 (33.29)	<0.0001
Active precautions	80 (8.89)	41 (23.7)	39 (5.36)	

Acting to get help during/after attempt (item 4)				
Notified potential helper regarding attempt	349 (38.78)	19 (10.98)	330 (45.39)	
Contacted but did not specifically notify potential helper regarding attempt	87 (9.67)	22 (12.72)	65 (8.94)	<0.0001
Did not contact or notify potential helper	464 (51.56)	132 (76.3)	332 (45.67)	
Final acts in anticipation of death (item 5)				
None	627 (69.67)	93 (53.76)	534 (73.45)	
Thought about or made some arrangements	211 (23.44)	52 (30.06)	159 (21.87)	<0.0001
Made definite plans or completed arrangements	62 (6.89)	28 (16.18)	34 (4.68)	
Active preparation for attempt (item 6)				
None	543 (60.33)	62 (35.84)	481 (66.16)	
Minimal to moderate	309 (34.33)	80 (46.24)	229 (31.5)	<0.0001
Extensive	48 (5.33)	31 (17.92)	17 (2.34)	
Suicide note (item 7)				
Absence of note	782 (86.89)	145 (83.82)	637 (87.62)	
Note written, but torn up; note thought about	48 (5.33)	11 (6.36)	37 (5.09)	<0.0001
Presence of note	70 (7.78)	17 (9.83)	53 (7.29)	
Overt communication of intent before the attempt (item 8)				
None	361 (40.11)	64 (36.99)	297 (40.85)	<0.0001

Equivocal communication	370 (41.11)	78 (45.09)	292 (40.17)	
Unequivocal communication	169 (18.78)	31 (17.92)	138 (18.98)	
Alleged purpose of attempt (item 9)				
To manipulate environment, get attention, get revenge	139 (15.44)	2 (1.16)	137 (18.84)	
Components of above and below	398 (44.22)	47 (27.17)	351 (48.28)	<0.0001
To escape, surcease, solve problems	363 (40.33)	124 (71.68)	239 (32.87)	
Expectations of fatality (item 10)				
Thought that death was unlikely	210 (23.33)	2 (1.16)	208 (28.61)	
Thought that death was possible but not probable	463 (51.44)	37 (21.39)	426 (58.6)	<0.0001
Thought that death was probable or certain	227 (25.22)	134 (77.46)	93 (12.79)	
Conception of method's lethality (item 11)				
Did less to self than s/he thought would be lethal	233 (25.89)	8 (4.62)	225 (30.95)	
Wasn't sure if what s/he did would be lethal	529 (58.78)	69 (39.88)	460 (63.27)	<0.0001
Equaled or exceeded what s/he thought would be lethal	138 (15.33)	96 (55.49)	42 (5.78)	
Seriousness of attempt (item 12)				
Did not seriously attempt to end life	213 (23.67)	1 (0.58)	212 (29.16)	
Uncertain about seriousness to end life	428 (47.56)	41 (23.7)	387 (53.23)	<0.0001
Seriously attempted to end life	259 (28.78)	131 (75.72)	128 (17.61)	
Attitude toward living/dying (item 13)				

Did not want to die	111 (12.33)	3 (1.73)	108 (14.86)	
Components of above and below	396 (44)	31 (17.92)	365 (50.21)	<0.0001
Wanted to die	393 (43.67)	139 (80.35)	254 (34.94)	
Conception of medical rescuability (item 14)				
Thought that death would be unlikely if he received medical attention	306 (34.0)	7 (4.05)	299 (41.13)	
Was uncertain whether death could be averted by medical attention	504 (56.0)	98 (56.65)	406 (55.85)	<0.0001
Was certain of death even if he received medical attention	90 (10.0)	68 (39.31)	22 (3.03)	
Degree of premeditation (item 15)				
None	390 (43.33)	28 (16.18)	362 (49.79)	
Suicide contemplated for three hours of less prior to attempt	263 (29.22)	41 (23.7)	222 (30.54)	<0.0001
Suicide contemplated for more than three hours prior to attempt	247 (27.44)	104 (60.12)	143 (19.67)	

Text in **Bold** means p -value <0.05

Figure 1. Multiple correspondence analysis plot for dimensions 1 and 2. Each small circle marked with "I.a_b" indicates the response b to SIS item a.

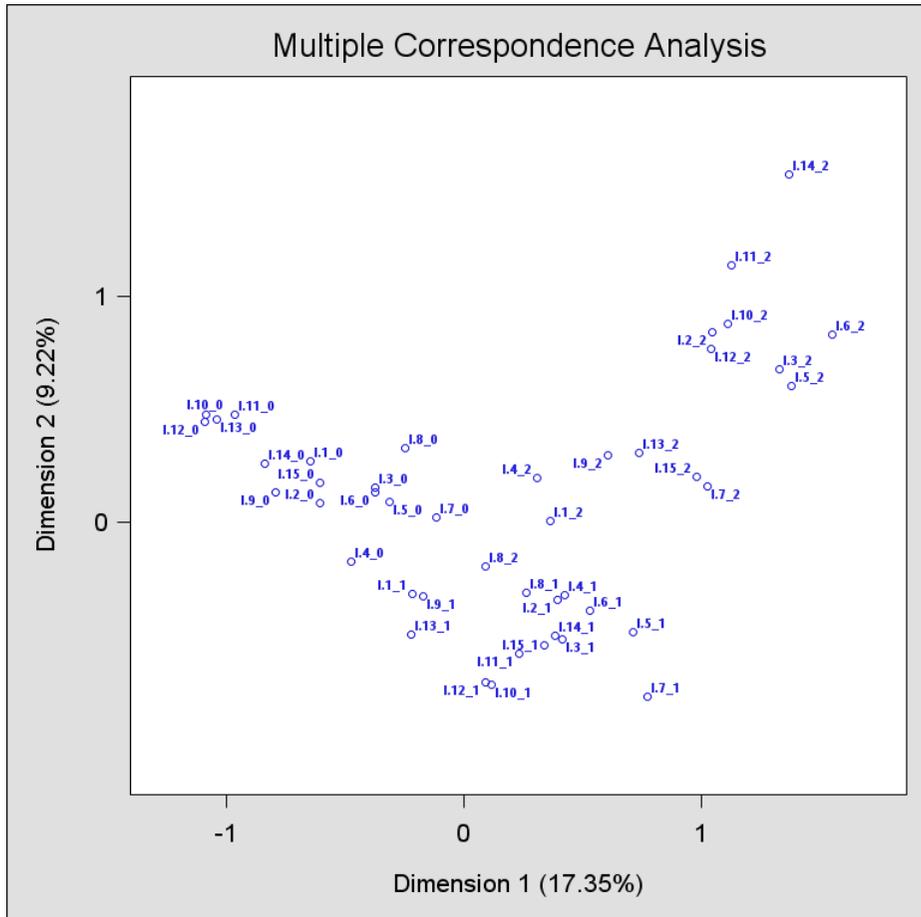


Figure 2. Graph of the CCC, Pseudo F statistic, and Pseudo T-squared against the number of clusters

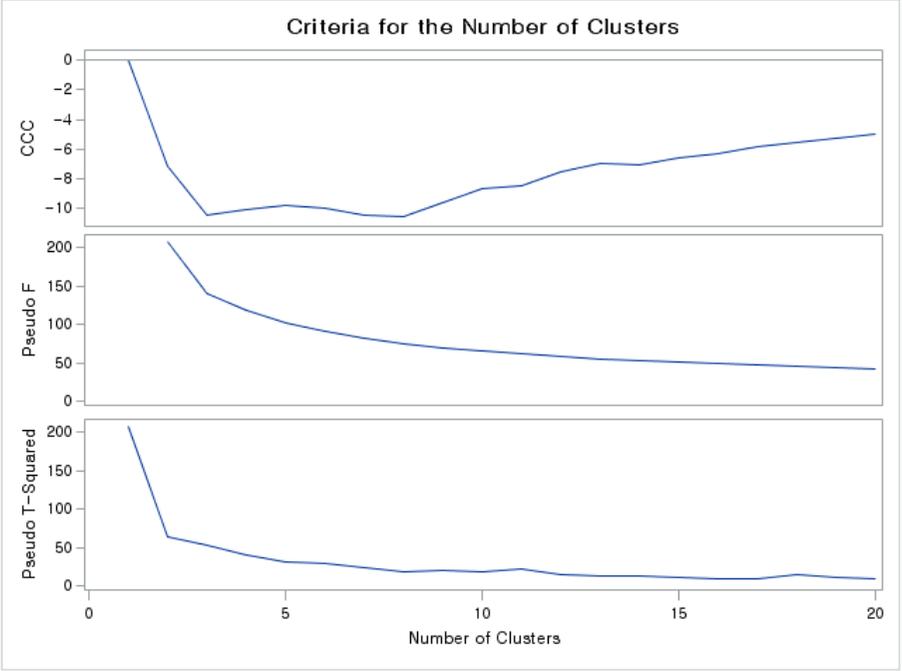
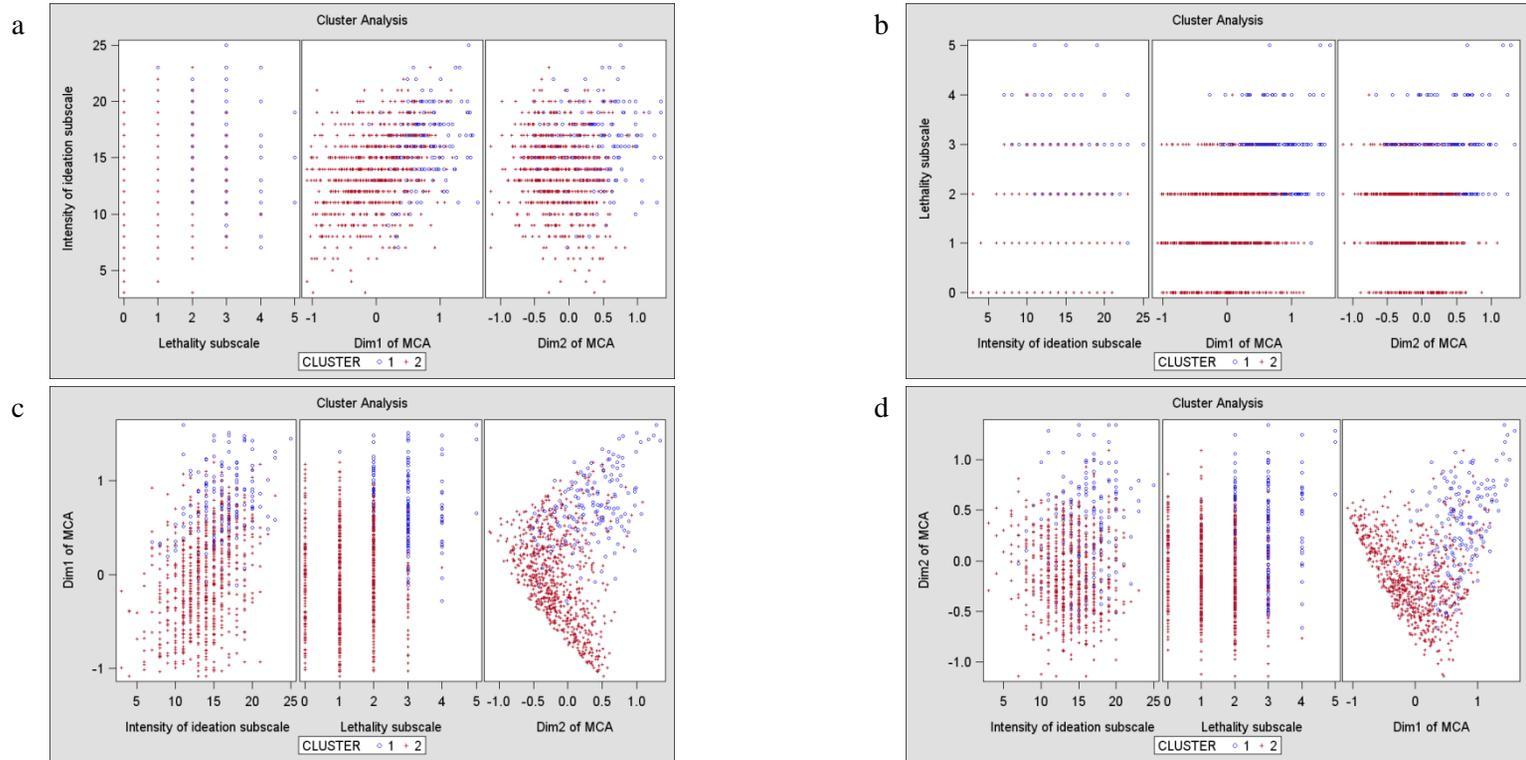


Figure 3. Scatter plot of the two-cluster solution. The scatterplot matrix shows all pairwise scatter plots of input variables



요약(국문 초록)

서론: 자살시도자 집단은 균일한 집단이 아니며, 이들 집단의 구조와 특성을 이해하는 것은 효과적인 자살 방지 대책을 수립하는데 있어서 필수적이다. 본 연구에서는 군집분석을 이용하여 우리나라 자살시도자들을 분류해보고자 하였다.

방법: 자살시도 후 응급실을 이용한 환자 900명을 대상으로 인구학적 특성, 임상적 병력, 금번 자살시도의 특성 등을 조사하였다. 그 중 자살의도검사의 각 항목과 컬럼비아 대학 자살심각도 척도 중 자살사고의 강도 및 자살행동의 치명도 값으로 토대로 군집분석을 시행하였다.

결과: 군집분석 결과 두 개의 하위집단이 추출되었다. 전체 대상자의 약 19.22%에 해당하는 하위집단은 자살시도 시 치명도가 높은 자살방법을 이용하였고 타인의 방해를 피하기 위한 더 많은 조치를 취하는 등 더 심각하고 계획적인 자살시도를 하였다. 반면 80.77%의 대상자는 계획되지 않은 자살시도를 하였는데, 주로 치명도가 낮은 자살방법을 이용하였으며 죽음에 대해 양가적인

감정을 가지고 있었다. 두 하위집단 간에는 일부 인구학적, 임상적 특성에서 차이가 있었는데, 계획되지 않은 자살시도를 한 하위집단은 과반수 이상 여성으로 이루어진 반면 계획된 자살시도를 한 하위집단은 남성시도자가 더 많았으며 평균 연령도 6세가량 더 높았다. 자살 시도 당시 정신과적 치료를 받고 있었던 대상자의 비율은 계획되지 않은 시도를 한 하위집단에서 더 높았으며, 신체적 질환을 앓고 있는 비율은 계획된 시도를 한 하위집단에서 더 높았다.

결론: 우리나라 자살시도의 상당수가 충동적으로 이루어지고 있다는 사실을 통계적 방법으로 확인할 수 있었다. 이는 자살시도자의 특성에 따른 맞춤형 자살예방 대책의 수립이 필요함을 의미한다.

주요어: 자살, 자살시도, 군집분석, 자살의도검사

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