Classifying depression in university students by using the latent structure model

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Abstract

The goal of the present study is to reexamine whether the latent structure of depression is dimensional or categorical. Participants comprises 129 undergraduates (76 male and 53 female). The participants completed the Japanese version of the self-rated depression scale. The results, using the latent class model, suggest that: (1) the latent structure of depression is categorical (extracting the four latent classes) and (2) differences in each category are the degree of the depression's symptoms.

Keywords: Depression・University Students・Latent Structure Analysis

1. Introduction

Despite the fact that DSM-Ⅳ-TR(American Psychiatric Association, 2000)and ICD-10(World Health Organization, 1992) were developed based on evidence, the validity of the classification of major depression has not been well established. Recently, group of major depression in diagnosis on the basis of DSM is heterogeneity (Symposium Melancholia, 2007). Thus, the central debate in the depression literature is whether depression is categorical or dimensional. Specifically, categorical view is that depressed mood in depressed patient is qualitatively different from the negative mood in helthy people. Dimensional view is that depressed mood and negative mood are continuous. Both positions have staunch advocates.

However, recent depression studies suggest that the dimensional model is more useful than the categorical model (Okumura, Y., Sakamoto, S., Tomoda, A., Kijima, N., 2009). Okumura et al. (2009) suggested that researchers should not stratify participants on the basis of a conventional cutoff score because depression follows a dimensional model. In addition, Sugiura (2009) reported that psychiatric disorders also adhere to a dimensional model.

some problems exist in previous researches on continuity controversy of depression. Because these research results following problems: (1) these researches use different indicators and (2) participants in these studies are different types of depression. Thus, determining that depression is dimensional is a hasty conclusion at the present stage.

The purpose of this paper, therefore, is to reexamine whether depression is categorical or dimensional. This study uses latent class analysis. Latent class analysis is a method of classifying individuals from a heterogeneous population into smaller, relatively homogenous unobserved subgroups (B. Muthén & Muthén, 2000). If a sample of reporting depression

scale was grouped in classes using latent class analysis, then some symptoms of depression would be regarded as categorical. On the other hand, if only single class wasyielded by this analysis. The concept of depression should be homogeneous and some symptoms reflected a different phases of single factor.

2. Method

2. 1 Sample and measure

The participants of the present study were 129 undergraduates (76 men and 53 women) who ranged in age from 18 to 25 years (M = 19.11, SD = 1.22). All the participants completed the Japanese version of the SDS (Fukuda & Kobayashi, 1973). In using the SDS, item responses were ranked from 1 to 4 : (1) "a little of the time," (2) "some of the time," (3) "a good part of the time," and (4) "most of the time."

2. 2 Data analysis

Analysis of the study data employed statistical techniques with R (ver2.10.1). We used packages that were mclust (ver3.4.6) and psych (ver1.0-78).

3. Results

3. 1 Extraction of Latent Classes

We performed latent class analysis to analyze the latent structure of depression. We determined the number of clusters, which were evaluated on the basis of the Bayesian information criterion (BIC). In the latent class analysis, better fitting models have bigger BIC values (Kim, 2007). Therefore, the best fitting model, as indicated by the BIC, was the four-class model (Figure 1).

3. 2 Class Comparisons

After extracting the four latent classes, individuals were assigned to their most likely class and compared using the symptom approach. The symptom approach can develop a detailed analysis rather than determine the approach of disease (Persons, 1986). In this study, SDS items were classified on the basis of a method similar to the investigation of Okumura, Sakamoto, Tomoda, Kijima' s (Table 1). Classified symptoms were sectioned into five classes. Furthermore, we calculated the sum of each class.

We conducted group comparisons using one-way ANOVAs (Table 2). Significant differences among the classes were observed for Persistent depressed mood and guilt, F (3, 125) = 27.01, $p < .01$; Pervasive Anhedonia (loss of interest), F (3, 125) = 25.25, $p < .01$; Sleep disorder and easy fatigability, F (3, 125)= 18.05, $p < .01$; Psychomotor retardation, F(3, 125) = 9.67, $p < .01$; and Total score, F (3, 125) = 54.42, $p < .01$. The main effect due to the change in weight or appetite was not significant.

In the main effect of these variables, the scores were subjected to multiple comparison tests using Tukey' s range test (Table 2). As a result, Tukey' s test showed that the class Ⅳ score of Persistent depressed mood and guilt (M = 7.33, SD =1.94) was significantly

higher ($p < .01$) than the scores for class Ⅱ ($M = 6.16$, $SD = 1.24$) and class Ⅲ ($M = 5.56$, $SD = 1.21$). The score of class Ⅰ was significantly lower ($p < .01$) than that of class Ⅲ.

For Pervasive Anhedonia (loss of interest), it was shown that the class Ⅲ score ($M = 6.59$, $SD = 1.16$) was significantly higher ($p < .01$) than the other classes. Further, the class Ⅰ score ($M = 5.00$, $SD = 1.18$) was significantly higher ($p < .01$) than the scores for class Ⅱ and class Ⅳ.

For Sleep disorder and easy fatigability, it was shown that the class Ⅳ score ($M = 6.11$, $SD = 1.36$) was significantly higher ($p < .01$) than the other classes. The other classes were not significantly different from each other.

For Psychomotor retardation, it was shown that the scores for class Ⅳ ($M = 7.00$, $SD = 2.00$) and class Ⅲ ($M = 6.36$, $SD = 1.39$) were significantly higher ($p < .01$) than the score for class Ⅰ ($M = 5.46$, $SD = 1.09$) and the score for class Ⅱ ($M = 5.10$, $SD = 1.08$). The difference between the class Ⅳ and class Ⅲ scores was not significant. Similarly, the difference between the class Ⅰ and class Ⅱ scores was not significant.

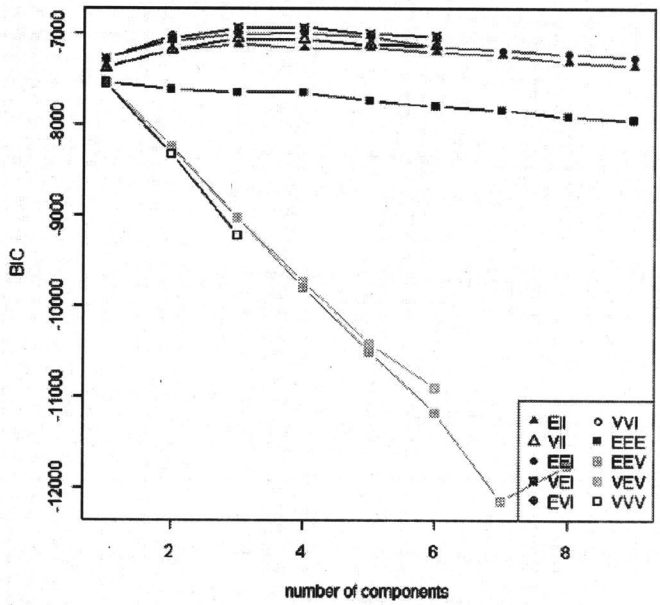

Figure 1 Number of clusters by latent class analysis

Table 1 Classified on the basis of DSM-Ⅳ-TR

Category	Item of SDS
1 Persistent depressed mood and guilt	Item 1 (I feel down - hearted and blue.) · Item 3 (I have crying spells or feel like it.) · Item 17 (I feel that I am useful and needed.)
2 Pervasive Anhedonia (loss of interest)	Item 6 (I still enjoy sex.) · Item 18 (My life is pretty full)
3 Sleep disorder and easy fatigability	Item 4 (I have trouble sleeping at night.) · Item 10 (I get tired for no reason.)
4 Psychomotor retardation	Item 9 (My heart beats faster than usual.) · Item12 (I find it easy to do the things I used to.) · Item13 (I am restless and can't keep still.)
5 Change in weight or appetite	Item5 (I eat as much as I used to.) · Item7 (I notice that I am losing weight.)

Table 2 Depression Symptpons and Total Score Among the Four Latent Classes of SDS

	Class Ⅰ (n = 50)	Class Ⅱ (n = 31)	Class Ⅲ (n = 39)	Class Ⅳ (n = 9)	multiple comparison (Tukey)
1 Persistent depressed mood and g	4.32 (0.89)	6.16 (1.24)	5.56 (1.21)	7.33 (1.94)	Ⅳ>Ⅱ, Ⅲ>Ⅰ
2 Pervasive Anhedonia (loss of int	5.00 (1.18)	4.55 (1.09)	6.59 (1.16)	4.33 (0.50)	Ⅲ>Ⅰ>Ⅱ, Ⅳ
3 Sleep disorder and easy fatigabil	3.22 (0.82)	4.29 (1.23)	3.67 (1.40)	6.11 (1.36)	Ⅳ>Ⅱ, Ⅲ, Ⅰ
4 Psychomotor retardation	5.46 (1.09)	5.10 (1.08)	6.36 (1.39)	7.00 (2.00)	Ⅳ, Ⅲ>Ⅰ, Ⅱ
5 Change in weight or appetite	4.82 (1.19)	4.81 (1.01)	5.36 (1.56)	4.56 (1.13)	-
Total score	36.30 (3.67)	38.55 (3.73)	46.05 (4.16)	45.33 (3.71)	Ⅲ, Ⅳ>Ⅰ, Ⅱ

4. Discussion

This paper investigated whether the latent structure of depression is dimensional or categorical. As a result of latent class model, four latent classes model were shown the best of fit index, so that the depression had some categories under the symptoms. What follows is a discussion of the analysis results in greater detail.

Latent class analysis resulted in identification of four subgroups, which differed regarding depression symptoms. The first group (class Ⅰ), comprising 39% of participants, exhibited the lowest total SDS score. This score is similar to the SDS score of normal participants in Fukuda & Kobayashi (1973). This class may be regarded as a "healthy" group.

The second group (class Ⅱ; 24% of the sample) exhibited the second lowest total SDS score of the four classes; however, this score is lower than the SDS score within neurosis participants in Fukuda & Kobayashi (1973). Members of this group experienced more depression symptoms than the first group. In particular, symptoms of "persistent depressed mood and guilt" and "sleep disorder and easy fatigability" were higher than in the first group. These symptoms scores were the second highest of the four classes. This class may be regarded a "subclinical" group.

The third and fourth groups exhibited increased clinical symptoms. The third group (class Ⅲ; 30% of the sample) exhibited the highest total SDS score. This score was similar to the SDS score of neurosis participants in Fukuda & Kobayashi (1973). Individuals in this group also experienced increased symptoms of "pervasive Anhedonia (loss of interest)" and "psychomotor retardation" than other groups. This class may be regarded a "neurosis" group. This group would also exhibit characteristics of major depression in DSM-Ⅳ-TR.

The fourth group (class Ⅳ; 7% of the sample) exhibited the second highest total SDS score. In this group, symptoms of "persistent depressed mood and guilt," "sleep disorder and easy fatigability," and "psychomotor retardation" were the highest the four groups. However, symptoms of "pervasive Anhedonia (loss of interest)" were the lowest of the four groups. Therefore, this class may be regarded an "atypical depression" group.

The results of this study were not similar to the conclusions of Okumura et al. (2009). In this study's conclusion, some symptoms of depression should be regarded as a categorical one. Therefore, it transpires that in the range of psychological aid, participants of Class Ⅲ and Class Ⅳ are within its range. In particular, aspects of Class Ⅳ have a feature that has recently been called "new depression." There are subtle arguments about treating "new depression" and whether to allow for differentiation between "new depression" and

neurotic depression in clinical settings. In this setting, the results of this research suggest an approach to these arguments: it is possible to distinguish between "new depression" and neurotic depression from the point of view of symptoms.

There are two limitations to the study. First, we used SDS for the depression scale. However, Okumura & Sakamoto (2004) suggest that SDS needs to be revised. Thus, the depression scale used to examine the latent structure of depression should use a revised SDS or other measures. Second, this study's participants were only undergraduate students. Thus, we need to ascertain whether the results match the results of clinical groups.

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