

Regular Article

Cognitive patterns and depression: Study of a Japanese university student population

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Abstract

According to Beck's cognitive theory, individuals who endure negative self-schemas (dysfunctional attitudes) are more likely to present automatic thoughts consisting of negative schemata of oneself and one's world while experiencing depression. In order to examine the relationships between depression, automatic thought, and dysfunctional attitude, 329 Japanese university students were given a set of questionnaires, including the Center for Epidemiologic Studies Depression Scale (CES-D), Automatic Thought Questionnaire-revised (ATQ-R), and Dysfunctional Attitude Scale (DAS). A structural equation model revealed that depression was predicted predominantly by automatic thought, which was in turn predicted by dysfunctional attitude. The male gender had a tendency to predict dysfunctional attitude. The link between a student's depression and dysfunctional attitude was mediated by automatic thought.

Key words

automatic thought, cognitive patterns, depression, dysfunctional attitude.

INTRODUCTION

Depression is one of the most prevalent mental disorders worldwide.^{1–4} It not only causes personal distress and social dysfunction, but also increases the likelihood of suicide.^{5–7} Depression is a major mental health issue among adolescents and young adults.^{8–14} The etiologies of depression are generally thought of as twofold: genetic and psychosocial.^{15–17} These psychosocial theories include Beck's cognitive theory of depression.^{18–21} Beck hypothesizes that cognitive vulnerability to depression is provided by dysfunctional schemata containing attitudes revolving around themes such as loss, inadequacy, and failure. Such dysfunctional attitudes include beliefs such as happiness depending on being perfect or seeking other people's approval. These depressogenic schemata are enduring but are particularly activated upon encountering negative life events. This is followed by the appearance of specific

negative cognitions (automatic thoughts) that take the form of overly negative beliefs about oneself, one's world, and one's future (the negative cognitive triad). These negative automatic thoughts are believed not to occur unless individuals are exposed to stressful situations. Interventions designed to alter such cognitions are effective in alleviating clinical depression.^{22,23}

According to this hypothesis, depression is expected to correlate with the negativity of depressed patients' automatic negative thinking. The Crandell Cognitions Inventory (CCI) and the Automatic Thoughts Questionnaire (ATQ) were developed as tools to measure such automatic thoughts.^{24–26} Depressed subjects generally score higher on these scales than non-distressed people,^{24,27–33} non-psychiatric medical patients,^{33,34} depressed patients in remission,^{27,29,33} or themselves in remission.^{28–30} Patients with depression scored higher than did heterogeneous non-depressed psychiatric control samples on the ATQ.^{26,28,33,34} The ATQ scores were correlated substantially with other measures of depression.³⁵ These data support the hypothesis that depression is led by negative automatic thought. The ATQ has been widely used in different languages, for example Norwegian,³⁶ Turkish,³⁵ and Korean.³⁷

The Dysfunctional Attitude Scale (DAS) was developed as a measure of the depressogenic schemata that

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persist even long before the depressive episode starts.³⁸ Several studies have shown that people with high scores on the DAS are more likely to be depressed.^{28,32,39–45} Weich *et al.*, in a longitudinal study, also demonstrated that higher DAS scores can predict the onset of depression.⁴⁶ The DAS has generally been used in different cultural settings such as Sweden,⁴⁷ Norway³⁹ and Turkey.⁴⁸

Some researchers investigated both the ATQ and the DAS. It was reported that the two measures correlated substantially.^{28,35,39} However, few have focused on the differences between the two with regard to severity of depression or the influence of one on another. The framework of Beck's cognitive hypothesis shows that the DAS would predict the ATQ, which would in turn predict depression.

This is a preliminary report, which studies the effects of the ATQ and DAS, as well as their influences on the severity of depression among the Japanese university student population.

METHODS

Participants

The participants consisted of students from two universities in Kumamoto City. A total of 376 questionnaires were distributed. Thirty-two students declined to participate in the study (91% response rate). We excluded two participants because in both cases the student's age was over 23, and 13 participants because five or more items of the Center for Epidemiologic Studies Depression Scale (CES-D) (CES-D) were missing. We also excluded five participants because the gender of the student was unknown. Thus, 324 cases were used for further analyses. There were 221 men and 103 women. The two genders did not differ in terms of age (men, mean age 19.5 ± 0.8 years; women, mean age 20.0 ± 0.9 years).

Measures

Center for Epidemiologic Studies Depression Scale

The CES-D is a 20-item self-report scale covering the main features of the depressive syndrome as identified within clinical and factor analytic grounds.⁴⁹ Radloff and Rae reported that the scale discriminated well between depressed psychiatric inpatients and a community sample.⁵⁰ Detailed evidence on reliability and validity of this scale is provided by Radloff.⁴⁹ Shima *et al.* translated the CES-D, and examined its clinical utility.⁵¹ The Japanese version of the CES-D has satisfactory levels of concurrent validity with the Hamilton

Rating Scale for Depression⁵² and the Zung Self-rating Depression Scale.⁵³ In addition, Shima *et al.* reported that it exhibits good test–retest liability and split-half reliability. Cronbach's alpha of the CES-D in these students was 0.85. In the clinical data reported by Radloff⁴⁹ the mean \pm SD was 24.42 ± 13.51 . (Note that the scoring of the scale in the present study was based on the 4-point scale from 1 to 4, so that the CES-D score of the present study is by definition 10 points higher than those of the other reports.)

Automatic Thoughts Questionnaire-Revised

In order to assess the extent to which an individual experiences negative automatic thoughts, the ATQ-Revised (ATQ-R)²⁶ was used. The 40 items were scored on a 5-point Likert scale, with 1 = not at all and 5 = all the time. A composite score was used in the present study; higher scores reflect a greater number of negative automatic thoughts. Cronbach's alpha for the composite score was 0.94. The Japanese version of the ATQ-R was backtranslated into English to confirm that the translation was consistent with the original intent. In the clinical data reported by Kendall *et al.*²⁶ the mean total score is 93.84 ± 24.13 .

Dysfunctional Attitude Scale

The DAS was designed to assess the beliefs or schemata underlying the characteristic cognitive content of depression within Beck's cognitive theory of emotional disorders.^{18,20,21,38} The 40 items were scored on a 7-point Likert scale ranging from 1 (totally agree) to 7 (totally disagree) and include, for example, 'My value as a person relies greatly on what others think of me', and 'If I fail at work, I am a failure as a person'. The scoring direction depended on whether agreement or disagreement on a particular belief was to be judged as a maladaptive response; a higher score indicated more maladaptive thinking. The DAS shows good internal consistency, with alphas ranging from 0.89 to 0.93.⁵⁴ The DAS has been found to display adequate psychometric properties.³⁸ The Japanese version of the DAS was produced by Professor Yutaka Ono who kindly gave us permission to use it. Cronbach's alpha of the DAS in these students was 0.86. In the clinical data reported by Dobson *et al.*²⁸ the mean total score is 146.8 ± 41.29 .

Statistical analysis

For descriptive purposes, univariate statistics were conducted on all the variables used and the demographic characteristics. Then, the hypothetical model was eval-

uated using structure equation modelling, to obtain direct and indirect effects between the variables, allowance for error terms (e.g. measurement error), and an indication of overall fit of the model (Fig. 1). The original model predicted that the CES-D score would be predicted by the ATQ-R and DAS scores as well as by the gender and age. The ATQ-R score would be predicted by the DAS score and by the gender and age. Finally, the DAS score would be predicted by the gender and age. We improved the model by deleting paths with no significant standardized regression weights. To assess the relative goodness of fit of our models, we employed several widely used indexes including the goodness-of-fit index (GFI), comparative fit index (CFI), and adjusted goodness-of-fit index (AGFI). The GFI and CFI assess the relative amount of variance and covariance that is predicted by the model. The CFI also adjusts for bias due to asymptotic sample size. All of these indices usually have values between 1 and 0. Values greater than 0.90 indicate that the model fits the data reasonably well. In addition, a criterion that takes parsimony into account when comparing models is Akaike's information criterion (AIC).⁵⁵ Another measure useful in comparing models of varying complexity is Steiger's root mean square error of approximation

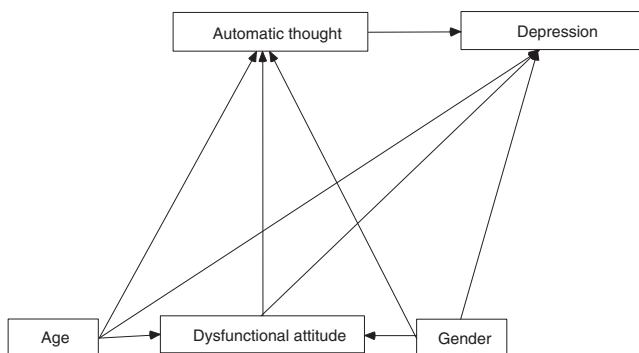


Figure 1. The hypothesized model.

(RMSEA).⁵⁶ It measures discrepancies per degree of freedom. Browne and Cudeck suggested that an RMSEA value of ≤ 0.05 indicates a good fit and that values up to 0.08 represent reasonable errors by approximation of the population.⁵⁷ Statistical analyses were conducted using SPSS 10.0 (SPSS, Chicago, IL, USA) and AMOS 4.0 (SmallWaters, Chicago, IL, USA).

Procedure

The questionnaires were distributed in class and were returned by hand. Informed consent was obtained from all participants before taking the questionnaires. This research project was approved by the Ethical Committee of Kumamoto University, Graduate School of Medical Sciences.

RESULTS

Descriptive and bivariate data

Descriptive data on all of the variables and the bivariate relations among the variables are shown in Table 1. The CES-D, ATQ-R, and DAS score were positively correlated with one another. The female gender was correlated with the lower score of the DAS. Age showed no correlation with any of the variables, except that of gender; the male participants were younger.

Testing the model: structural equation model procedures

We carried out structural equation modelling (Fig. 1). The original model, however, did not fit the data very well: GFI = 0.978; AGFI = 0.675; CFI = 0.948; RMSEA = 0.232. Then we improved the model by deleting paths with no significant standardized regression weights. The final model (Fig. 2) showed that depression was predicted by automatic thought and that automatic thought was predicted by dysfunctional attitude; it also

Table 1. Means, standard deviations, and correlation coefficients of the DAS, ATQ-R, and CES-D ($n = 324$)

Variables	Gender	Age	ATQ-R	DAS	Mean	SD
CES-D	-0.03	-0.05	0.79***	0.36***	36.9	9.16
Gender	-	0.24***	-0.08	-0.13*		
Age		-	-0.08	-0.04	19.6	0.84
ATQ-R			-	0.39***	97.2	25.00
DAS				-	139.0	23.60

ATQ-R, Automatic Thoughts Questionnaire-Revised; CES-D, Center for Epidemiologic Studies Depression Scale; DAS, Dysfunctional Attitude Scale.

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

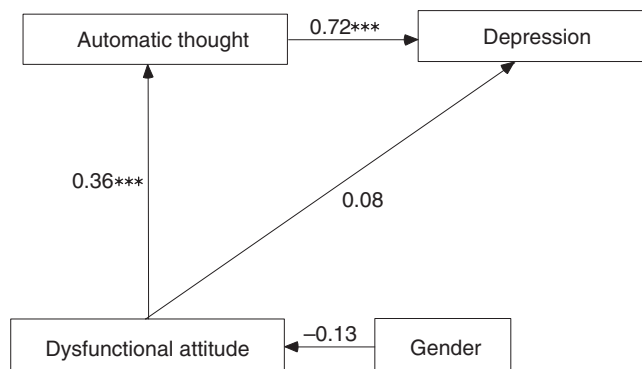


Figure 2. The path model predicting depression. Model showing standardized path coefficients of variables. *** $P < 0.001$.

showed that the gender predicted the dysfunctional attitude. This model produced vast improvement of the fit with data (AIC was reduced from 46.4 to 17.6) and better goodness-of-fit indices (GFI = 0.997; AGFI = 0.987; CFI = 1.00; RMSEA = 0.00).

DISCUSSION

According to Beck's hypothesis, depression can be explained by two major elements: depressogenic schemata and automatic thought.^{18,20} Both of these elements have been extensively studied. Our results also support previous investigations demonstrating that the severity of depression is linked to the greater tendency to have negative automatic thoughts and to view the self, world, and future negatively.

However, Beck emphasized that these cognitive styles should not be considered as independent but that they are correlated in a causative fashion. We performed a structural equation analysis built on Beck's cognitive hypothesis. This has revealed that the influence of dysfunctional attitudes on the severity of depression is mediated by automatic thought. The direct influence of the dysfunctional attitude on depression explains, although significant, only a very small portion of the variance of depression. Analysing data of negative life events among undergraduates using the ATQ, DAS, and Beck Depression Inventory by a structural equation model, Kwon and Oei found that in a cross-sectional design, depression was influenced by the ATQ score, which was in turn influenced by the DAS score as well as by the interaction between the negative life events and the DAS.⁴² The latter also influenced depression directly. Our study had similar results to that of Kwon and Oei.⁴² A shortcoming of the Kwon and Oei report is the lack of inclusion of explicit goodness-of-fit indices.⁴² They noted only the χ^2 value.

Nor did they use the AIC for improvement of models. We are confident about our model due to the use of several goodness-of-fit indexes and the AIC.

We integrated age and gender into our initial model. However, the age of the students failed to show a significant link to any cognitive styles or depression. The gender influenced only the dysfunctional attitudes. Thus, the female gender decreased the level of DAS. The DAS score was lower among women than men. At first sight, these findings seemed to be in contrast to the generally recognized fact that depression is more prevalent in women than men.⁵⁸⁻⁶² It may be interpreted that although women are less likely to establish depressogenic schemata, they are more likely to respond to exposure to adversity once they have obtained depressogenic cognitive styles.

The current study has several limitations. First, it is difficult to make generalizations due to the limitation of the sample population, which consisted of the students from only two universities. Clinical populations should be studied in the same methodology before extrapolating the data to non-clinical settings.

Second, the cross-sectional nature of the present study suggests that the hypothesized paths may be reversed. Although the present model was derived from the cognitive theory, there are six possible types of causal relationship between the CES-D, ATQ, and DAS. For example it may be that the DAS influences the CES-D that in turn influences the ATQ, which is also influenced by the DAS. We conducted the same structural equation modelling for these six models. Here we deleted the paths that failed to have statistical significance. The final models of these six types were compared for their goodness of fit to the data by the means of the AIC. We presumed that the model with the lowest AIC would reflect the data best. In these comparisons (data not shown) the model we presented in Fig. 2 showed no greater AIC than the other five possible models. We also argue that the wording of the instructions of the DAS indicates that it measure the participant's typical way of thinking, while those of the ATQ-R and CES-D indicate that they measure the participant's condition for the last week. Thus the instructions are also in accordance with the theory. However, these do not confirm the temporary sequence of what happens in the mind. This issue should be resolved in a longitudinal follow-up study.

Kwon and Oei studied undergraduates on two occasions within an interval of 3 months.⁴² In their model, the Time 1 DAS score predicted the Time 2 ATQ score, which predicted the Time 2 depression score; but the Time 1 DAS score failed to predict the Time 2 depression score. They warned, however, that in a different model, the Time 1 depression score predicted

the Time 2 ATQ, which predicted the Time 2 DAS score. The relationship between cognitive styles and depression over a long course of time may become more complicated. Beck's cognitive hypothesis takes for granted the fact that the dysfunctional attitude is deeply rooted in the human mind and is of an enduring nature. A few studies reported that the DAS score was independent of the state in depressed patients.^{28,30} Therefore, the dysfunctional attitude is a trait.⁶³ However, there are many other studies that showed that the DAS score was state dependent.^{54,64} The contradictory results have led to a lively debate.^{65–68} Comparisons of the DAS scores between those who are in remission from depression and non-depressed controls did not reach a consensus.^{28,30,69,70} When performing a longitudinal study, one should implement multiple observation times using the same measurements. In a study like this, however, an obstacle is standardization of adversity, which is found to be difficult in a natural environment. One possibility is the use of a situation where the same or similar event takes place, for example during childbirth, a natural disaster, or an examination.

A neglected area of research about the cognitive hypothesis of depression is its origin. Beck suggested that depressogenic schemata and automatic thoughts derived from early relationships with the parents.²⁰ However, this area has not been studied in great depth. Also neglected is research into logical thinking error. Beck's cognitive theory has postulated that negative cognitive patterns are accompanied by certain systematic logical errors (e.g. selective abstraction, and overgeneralization). However, the concept of the logical thinking error is a very new entry in the cognitive theory of depression. This has rarely been incorporated into the research of the cognitive model of depression. We are aware only of the Ito *et al.* report on the relationships of logical thinking errors with other variables in the framework of the cognitive theory of depression.⁷¹ In that report, the logical thinking error mediates the effects of the DAS on the ATQ. This issue is worth further investigation.

The present study reports that in a structural equation model, the effects of the dysfunctional attitudes on the severity of depression are mediated by automatic thought. Longitudinal studies are necessary to solve these methodological challenges.

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