The Effects of Dichotomous Thinking on Depression in Japanese College Students

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Abstract

The purpose of this study was to explore the effect of dichotomous thinking on depression. We attempted to test the following hypotheses: 1) dichotomous thinking increases depression, and 2) dichotomous thinking has two routes to increase depression—direct, associative processing, and indirect, reflective processing. Two hundred Japanese college students (Males: 107, Females: 93, M age= 20.02 ± 1.42) were asked to complete the Dichotomous Thinking Inventory, which consists of three subscales: dichotomous belief, profit-and-loss thinking, and preference for dichotomy; the Kessler 6 Distress Scale; and the Japanese version of the Rumination-reflection Questionnaire. We conducted structural equation modelling to test the hypotheses. The results supported the hypotheses and indicated that dichotomous thinking increased depression. There were two different routes: dichotomous belief directly increased depression and profit-and-loss thinking indirectly increased depression by way of rumination. There are some implications of the findings. This study suggests that cognitive distortions might causes depression from two paths and practical interventions might also have two different routes or approaches to depression.

Keywords: dichotomous thinking, depression, rumination, dual process theory, cognitive distortion

1. Introduction

Beck's cognitive theory assumes that some individuals may be vulnerable to depression because they develop dysfunctional beliefs as a result of early learning experiences (Beck, 1967). Negative automatic thoughts that dominate the thinking of many depressed persons are sustained through systematic distortions of information processing and contribute to further depression (Scott, 2001). Thus, cognitive distortions are negatively biased errors in thinking that are purported to increase vulnerability to depression (Beck, 1976; Dozois & Beck, 2008; Acharya & Relojo, 2017). Cognitive distortions first described by Beck et al. (1979) were expanded by Burns (1980), who identified the following 10 common depressotypic thinking errors: 1) mindreading (i.e., postulating that others are thinking negatively about oneself); 2) catastrophizing (i.e., making negative predictions about the future based on little or no evidence); 3) all-or-nothing thinking (i.e., viewing something as either-or, without considering the full spectrum and range of possible evaluations); 4) emotional reasoning (i.e., believing something to be true based on emotional responses rather than objective evidence); 5) labeling (i.e., classifying oneself negatively after the occurrence of an adverse event); 6) mental filtering (i.e., focusing on negative information and devaluating positive information); 7) overgeneralization (i.e., assuming that the occurrence of one negative event means that additional bad things will happen); 8) personalization (i.e., assuming that oneself is the cause of a negative event); 9) "should" statements (i.e., thinking that things must or should be a certain way); and 10) minimizing or disqualifying the positive (i.e., ignoring or dismissing positive things that have happened).

1.1 A Dual Process Model of Cognitive Vulnerability to Depression

Beevers (2005) expanded the cognitive model to propose a dual process model of cognitive vulnerability to depression. Dual process models, which articulates the characteristics of human cognition from a broad framework, have been applied in many areas of psychology and he applied those to the mechanism of depression (Pennycook, 2017). According to dual process theories, humans possess two modes of information processing: an associative

mode and a reflective mode. The associative mode involves quick, effortless processing based on well-learned associations. The reflective mode involves slow, effortful processing that relies on symbolic, rule-based inferences. Whereas the associative mode occurs automatically, the reflective mode operates when expectancies are disappointed and sufficient cognitive resources are available to respond. In Beevers's (2005) model, a cognitive vulnerability to depression is observed when negatively- biased associative processing is uncorrected by reflective processing. Life stresses appear to deplete the cognitive resources needed for reflective processing to correct negatively biased associative processing. This dual process of self-referent association and cognitive reflection is thought to be important for emotion regulation. Stikkelbroek et al. (2016) found that stress events and symptoms of depression were mediated by maladaptive cognitive emotion regulation strategies.

In recent years, an approach that focuses on the form of cognition, rather than on the content, has been gaining attention as a way to assess dysfunctional thinking. Researchers have theorized that the ability to flexibly engage in a variety of thoughts and behaviors to meet situational demands may be the best indicator of psychological health (Stange et al., 2017). A cognitive style, such as a tendency to respond to stimuli in extreme ways, have been found to predict the relapse of depression (Brouwer et al. 2019; Forand & DeRubeis, 2014; Teasdale et al., 2001). Forand and DeRubeis (2014) defined extreme responding as the tendency to endorse end-of-scale responses such as "disagree strongly" or "agree strongly" on cognitive questionnaires, such as the Dysfunctional Attitudes Scale (Weissman, 1979). Beevers et al. (2003) have characterized extreme responding as "reflect[ing] rapid, automatic information processing that is uncorrected by subsequent reappraisal" (p. 494). This automatic information processing style has been linked to cognitive biases, including "dichotomous thinking" or "perfectionism" and it is thought to produce extreme cognitive and emotional reactions that confer vulnerability (Beevers et al., 2003; Teasdale et al., 2001). Some studies have indicated that cognitive therapy reduced the relapse of depression via changes in the style rather than the content of thinking (Scott, 2001). For instance, Beck and Alford (2009) insisted that one of the central goals of CBT or cognitive therapy is to improve the patient's ability to think about events in a different light and to make alternative attributions.

1.2 Dichotomous Thinking and Mental Health

Dichotomous thinking, one of the depressotypic cognitive biases described above, has also been shown to be linked to negative psychological outcomes other than depression. Beck et al. (1990) indicated that dichotomous thinking has been related to some cluster B personality disorders, such as borderline personality disorder, narcissistic personality disorder, and histrionic personality disorder, and cluster C personality disorders, such as dependent personality disorder and obsessive-compulsive personality disorder. Dichotomous thinking involves a kind of cognitive rigidity that leads to a polarized perception of reality (e.g., food is either "good" or "bad"). This thinking style has been shown to be an important factor in the maintenance of eating disorders (Antoniou et al., 2017; Fairburn et al., 2003). Dichotomous thinking increases obsessive processing tendencies by stimulating guilt after consuming forbidden foods (Dewberry & Usher, 1994) and by strengthening their fascination with forbidden foods (Mann & Ward, 2001). In clinical perfectionism, dichotomous thinking is a major factor in its maintenanceand that it biases individuals' assessment of their own achievement of the standards they demand of themselves (Kothari et al., 2016; Shafran et al., 2002). Thus, dichotomous thinking has been shown to be related to many negative psychological outcomes.

Although knowledge about the relationship between dichotomous thinking and other mental health problems has been collected through empirical research, there is little empirical evidence about the relationship between dichotomous thinking and depression. Oshio (2009) developed the Dichotomous Thinking Inventory (DTI) and demonstrated the reliability and validity of this instrument. DTI consists of three subscales: preference for dichotomy, dichotomous belief, and profit-and-loss thinking. The preference for dichotomy subscale measures a style of thinking that avoids ambiguity and obscurity and that favors distinction and clarity. The Dichotomous Beliefs subscale assesses a way of thinking that believes that everything in the world can be divided into two categories, like right and wrong, instead of being treated as one indivisible thing. The profit-and-loss thinking measures the degree to which a person is motivated by the urge to gain real benefits and avoid disadvantages.

Mieda and Oshio (2015) showed that preference for dichotomy and profit-and-loss thinking of DTI positively correlated with the response time of framing tasks (Kahneman & Tversky, 1986), whereas dichotomous belief negatively corelated to it. Oshio (2012) concluded that preference for dichotomy and profit-and-loss thinking are reflective modes of cognition, and dichotomous belief is an associative mode of cognition.

The first purpose of this study was to explore the effect of dichotomous thinking on depression, focusing on the functional differences among DTI's subscales. Given Beevers's dual factor model, we hypothesized that dichotomous thinking will directly increase depression as an associative cognitive mode (Hypothesis 1).

1.3 Rumination and Depression

Rumination is a key cognitive or behavioral feature of dysphoria and major depressive disorder (e.g., Olatunji et al., 2013; Nolen-Hoeksema et al., 2008). A number of studies have shown that depressive rumination maintains and exacerbates depressed mood (Nolen-Hoeksema & Morrow, 1993; Nolen-Hoeksema et al., 1994), and is associated with predicted elevations in levels of depressive symptoms (Abela et al., 2012). Rumination contributes to depression by activating the individual through repeated recall, even after the stressor has ended (Hosseinichimeh et al., 2018). Papageorgiou and Wells (2004) defined ruminative thoughts as follows: (1) associate with the antecedents or nature of negative mood, (2) are not target-directed and do not motivate individuals to create plans to improve the situation, and (3) are not socially shared as long as individuals are involved in rumination. Papageorgiou and Wells (2004) discussed that while negative automatic thoughts are simple, brief evaluations of loss and mistake in depression, rumination consists of a series of self-focused, repetitive, cyclical, negative thoughts that tend to arise as a response to the initial negative thoughts held. Thus, rumination is thought to be an example of Beever's (2005) reflective processing. Therefore, we hypothesized that dichotomous thinking as an associative cognitive mode will increase depression by raising rumination as a reflective cognitive mode (Hypothesis 2). Figure 1 shows our hypothetical model in this study.
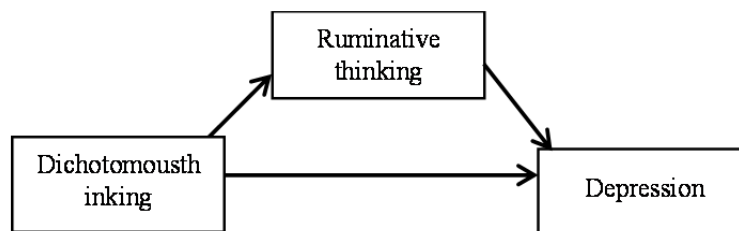

Figure 1. Hypothetical Model

2. Method

The Method section describes in detail how the study was conducted, including conceptual and operational definitions of the variables used in the study, Different types of studies will rely on different methodologies; however, a complete description of the methods used enables the reader to evaluate the appropriateness of your methods and the reliability and the validity of your results, It also permits experienced investigators to replicate the study, If your manuscript is an update of an ongoing or earlier study and the method has been published in detail elsewhere, you may refer the reader to that source and simply give a brief synopsis of the method in this section.

2.1 Participant

Two hundred Japanese college students participated in the study (Males: 107, Females: 93). All participants were between 18 and 28 years old (M age = 20.02; SD = 1.42). They were recruited through lectures as volunteer participants.

2.2 Procedure

Participants completed this study in classrooms. Data were collected from September to October 2016. They were asked to fill out the DTI (Oshio, 2009), the Kessler 6 Distress Scale (Furukawa et al., 2003; Kessler et al., 2003;) and the Japanese version of Rumination-reflection Questionnaire (RRQ) (Takano & Tanno, 2008; Trapnell & Campbell, 1999).

The study was approved by the Ethical Committee of Human Research, Shokei University (No. 016 - 16). Participants were informed about the study in written and verbal form. They were also informed that the data would be treated with the confidentiality and that they could stop the study at any time if they wanted to. Only those who provided written informed consent were included in the study, including those prior to the initial data collection. Participants were not paid for their participation in the study.

2.3 Measures

Dichotomous thinking. The 15-items of the DTI (Oshio, 2009) were used to measure dichotomous thinking style. DTI consists of dichotomous preference (a style of thinking that leads us to prefer explicitness, clarity, and brevity as opposed to ambiguity, obscurity, and uncertainty), dichotomous beliefs (the belief that things in the world can always be divided into two categories, such as "black or white," "success or failure," and "friend or foe"), and

gain-loss thinking (thinking about how to benefit from a situation and how to avoid disadvantages). The DTI items were scored on a 6-point scale ranging from 1 = disagree strongly to 6 = agree strongly. Internal consistency of each DTI subscale was good (preference for dichotomy: α =.74, dichotomous belief: α =.71, profit-and-loss thinking: α =.68).

*Rumination-reflection.*The participants completed the Japanese version of the RRQ (Takano & Tanno, 2008; Trapnell & Campbell, 1999). The RRQ is a self-report questionnaire that assesses two forms of self-attentiveness: self-rumination and self-reflection.Self-reflection is a neurotic form of self-attention, and self-reflection is a less neurotic, more openness-related form of self-attention.The RRQ consists of two subscales with 12 items each, ranging from 1 "strongly disagree" to 5 "strongly agree." It is graded on a 5-point scale. The internal consistency of the RRQ was good (α =.89).

Depression. The Japanese version of the Kessler Screening Scale for Psychological Distress (K6) (Kessler et al., 2002; Furukawa et al., 2008) was used to measure depression. Participants were asked to respond to 6 items on a 5-point rating scale ranging from 1 "all of the time" to 5 "none of the time." The optimal cutoff point on K6 is 9+, with higher scores indicating higher levels of distress. The internal consistency of the K6 was good (α =.85).

Include in the Method section information that provides definitions of all primary and secondary outcome measures and covariates, including measures collected but not included in this report. Describe the methods used to collect data (e.g., written questionnaires, interviews, observations) as well as methods used to enhance the quality of the measurements (e.g., the training and reliability of assessors or the use of multiple observations). Provide information on instruments used, including their psychometric and biometric properties and evidence of cultural validity.

2.4 Consideration of Human Rights

In this study, the human rights of participants were protected as follows. The following statements were printed clearly on the face sheet of the questionnaire: "there is no right or wrong answer," "if you do not want to answer some questions, please skip these," "because survey answers are analyzed statistically, each personal answer is not identified," and "the author disposes of all questionnaires responsibility."

3. Results

3.1 Descriptive Statistics and Correlations between Variables

Descriptive statistics and correlations between all the measures are shown in Table 1 and Table 2. K6 and dichotomous belief were weakly correlated (r = .27, p < .01). K6 and profit-and-loss thinking were also weakly correlated (r = .14, p < .05). Rumination and profit-and-loss thinking were weakly correlated (r = .26, p < .05). Rumination and K6 were moderately correlated (r = .57, p < .01).

Table 1. Descriptive Statistics of All the Measures

	Mean	*SD*
Preference for dichotomy	3.68	0.87
Dichotomous belief	2.83	0.94
Profit-and-loss thinking	4.27	0.81
K6	1.03	0.84
Rumination	3.31	0.75

Table 2. Zero Order Correlations of Variables

	1		2		3		4		5
1 Preference for dichotomy	-								
2 Dichotomous belief	.47	**	-						
3 Profit-and-loss thinking	.65	**	.32	**	-				
4 K6	.05		.27	**	.14	**	-		
5 Rumination	.08		.11		.26	**	.57	**	-

** *p*<.01

3.2 Differences between Depressive and Non-depressive Groups

Participants were divided into depressive (n=60) and non-depressive groups (n=140) based on the cutoff point of the K6 (9+). Comparing the three DTI subscales and RRQ between the two groups, we found that depressive participants had higher preference for dichotomy, dichotomous belief, profit-and-loss thinking, and rumination scores than non-depressive participants (Table 3).

Table 3. Comparison between High and Low Depressive Groups of Students

	Low Depressive	High Depressive			
	Mean (SD)	*Mean* (SD)	t		df
Preference for dichotomy	3.60(0.85)	3.87(0.90)	-2.03	*	198
Dichotomous belief	2.66(0.88)	3.23(0.97)	-4.04	**	198
Profit-and-loss thinking	4.18(0.80)	4.50(0.80)	-2.57	*	198
Rumination	3.09(0.72)	3.82(0.54)	-6.99	**	198

** $p<.01$ * $p<.05$.

3.3 Structural Equation Analysis of the Model

A structural equation analysis based on maximum likelihood estimation (AMOS Ver. 20.0 for Windows, IBM) was applied to the hypothetical model in Figure 1. We entered preference for dichotomy, dichotomous belief, profit-and-loss thinking as dichotomous thinking in Figure 1. By deleting insignificant passes from this initial model, we reached a final model depicted in Figure 2, in which preference for dichotomy only enhanced depression by increasing dichotomous thinking and profit-and-loss thinking, dichotomous belief did not have a path to rumination, and profit-and-loss thinking only enhanced depression by increasing rumination. The overall fitness of the final model was of an acceptable level, as indicated by X2 (5) = 8.40, p = .14, GFI = .98, AGFI = .95, RMSEA = .06.
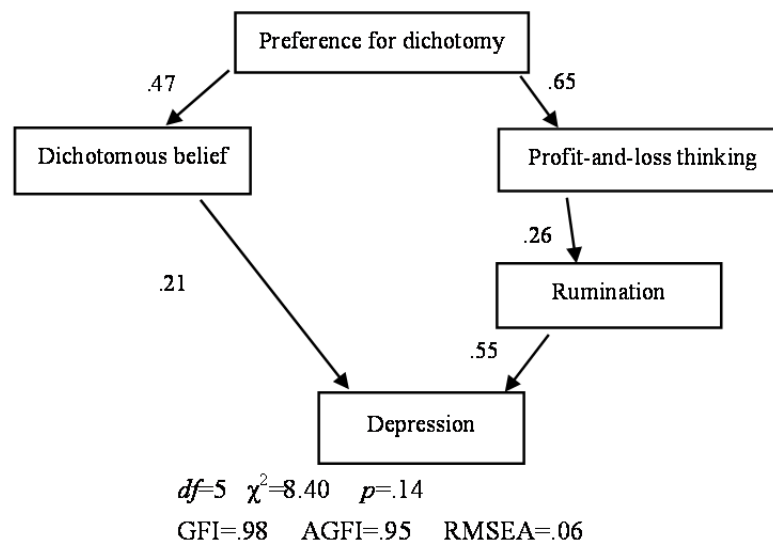

Figure 2. Structural Equation Model of Dichotomous Thinking and Depression

4. Discussion

Hypotheses 1 and 2 were both supported: dichotomous thinking enhanced depression in two ways. While dichotomous belief directly enhanced depression, profit-and-loss thinking enhanced depression by increasing rumination. Preference for dichotomy indirectly enhanced depression by increasing dichotomous belief and

profit-and-loss thinking. The results almost replicated the results of Mieda and Oshio (2015); the difference was that preference for dichotomy was behind dichotomous belief and profit-and-loss thinking, influencing both.

Beevers (2005) pointed out that an associative mode of information processing involves quick, effortless processing, which completes patterns based on associations between the current stimulus and previously encoded stimuli. That is, information that has been previously associated with the salient features of the current stimulus is activated when that stimulus is encountered once again. Thus, past experience facilitates processing of current information. It is similar to belief or schema, which aids in interpreting how the world or things are. The items of dichotomous belief also indicate how "anything" in the world can be divided into two categories: black or white, good or bad, or winner or loser. Therefore, the results illustrated that dichotomous belief directly increased depression as an associative mode.

Profit-and-loss thinking consists of items that ask for the meaning of the events relating to oneself. Oshio (2012) suggested that profit-and-loss thinking represents focusing on one's own benefits and advantages, and people with this thinking style may avoid disadvantages. Therefore, individuals who obtains a high score in profit-and-loss thinking are likely to focus their attention on themselves. Trapnell and Campbell (1999) divided self-attention into rumination and reflection. Thus, it is possible that profit-and-loss thinking, which contains the activation of a kind self-focusing, increased rumination. Rumination is known to cause and maintain depression (McLaughlin & Nolen-Hoeksema, 2011). Hence, it is plausible that profit-and-loss thinking as a kind of perfectionism enhances depression by increasing rumination.

Preference for dichotomy indirectly increased depression by increasing the other two subscales of DTI. This result suggests that preference for dichotomy is a core schema of dichotomous thinking. However, further investigation is needed.

The relationship between dichotomous thinking and depression has also been indicated in the context of perfectionism. The perfectionism-depression link has been widely demonstrated (Flett et al., 2003; Hewitt & Flett, 1991). Ferrari et al. (2018) regarded perfectionism as a primary mechanism underpinning the development and maintenance of depression. Several studies have documented that dichotomous thinking is associated with perfectionism. Shafran et al. (2002) associated dichotomous thinking with perfectionism in their perfectionism model. They showed that dichotomous thinking is a central factor maintaining perfectionism. Oshio (2009) suggested that the three subscales of DTI relate to perfectionism in different ways: the profit-and-loss subscale is associated with both positive and negative aspects of perfectionism; the preference for dichotomy subscale may be related to the positive aspects of perfectionism; and the dichotomous belief subscale is associated with the negative aspects of perfectionism. According to our results, dichotomous belief directly increased depression, while profit-and-loss thinking indirectly increased depression. Harris et al. (2008) demonstrated that rumination mediated the relationship between maladaptive perfectionism and depressive symptoms. If the profit-and-loss subscale measures rumination due to obsession, negative aspects of perfectionism might increase depression.

The present study revealed that there are two routes by which cognitive distortions can cause depression, and from this it can be suggested that practical interventions for the amelioration of depression may also require different approaches, corresponding to these two different pathways. It is also possible that the dysfunctional areas may differ among patients who show symptoms of depression.

This study was based on a self-completed questionnaire by Japanese college students. We need to replicate our results in more experimental situations in which conditions are strictly controlled. It is also necessary to expand our results regarding the age and socioeconomic status of participants to assess the generalizability of our findings.

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