The Confluence

Volume 1 | Issue 1 Article 4

August 2021

Relationships between Dichotomous Thinking and Other Cognitive Distortions

Nam Duc Nguyen
Lindenwood University, namducnguyen8598@gmail.com

Abstract

***Introduction*.** Both dichotomous thinking and other types of cognitive distortions were associated with various mental disorders and suicidality. No known study has examined the relationship between dichotomous thinking and other cognitive distortions, and no known measure of cognitive distortions has integrated dichotomous thinking. ***Objective*.** This study examined the relationships between dichotomous thinking and seven other cognitive distortions; namely, jumping to conclusions, belief inflexibility, external attribution bias, overgeneralization, selective abstraction, catastrophizing, and personalization. ***Method*.** An online survey integrated measures for dichotomous thinking from the Dichotomous Thinking Inventory (Oshio, 2009); jumping to conclusions, belief inflexibility, and external attribution bias from the Davos Assessment of Cognitive Biases Scale (van der Gaag et al., 2013); and overgeneralization, selective abstraction, catastrophizing, and personalization from the Cognitive Errors Questionnaire (Moss-Morris & Petrie, 1997). ***Results*.** Dichotomous thinking had weak positive correlations with jumping to conclusions, belief inflexibility, external attribution bias, and a very weak positive correlation with selective abstraction. Age had a negative correlation with dichotomous thinking and belief inflexibility. Adjusting for multicollinearity, belief inflexibility and age best predicted dichotomous thinking. Men and women did not differ significantly on cognitive distortions. ***Conclusions*.** Dichotomous thinking had statistically significant positive correlations with jumping to conclusions, belief inflexibility, external attribution bias, and selective abstraction. Further investigations can focus on potential causal, mediating, or moderating relationships among these five constructs.

Keywords: cognitive distortions, dichotomous thinking, jumping to conclusions, belief inflexibility, external attribution bias, selective abstraction

Relationships between Dichotomous Thinking and Other Cognitive Distortions

Cognitive distortions—various types of biases and errors in thinking—had associations with mental disorders and suicidal tendency. Using the Inventory of Cognitive Distortions (Yurica, 2002), Jager-Hyman et al. (2014) reported that individuals who attempted suicide scored significantly higher than the control group in externalization of self-worth, fortune telling, labeling, and comparison to others. In individuals not diagnosed with mental disorders, cognitive distortions were found to have associations with problematic, irrational behaviors. Barriga et al. (2000) found that, while incarcerated delinquents demonstrated higher degrees of cognitive distortions and problem behaviors than did a comparison group of high school students, in both groups, there were similarly strong correlations between self-serving cognitive distortions and externalizing problem behaviors (e.g., aggression) and between self-debasing cognitive distortions and internalizing problem behaviors (e.g., withdrawal, depression, anxiety). A set of five cognitive distortions, including illusion of control and probability misjudgments, best explained the severity of adolescent gambling behavior (Cosenza & Nigro, 2015). Studying cognitive distortions in non-disordered individuals can help detect when cognitive distortions occur, predict behaviors, and enhance decision-making.

Several measures of various types of cognitive distortions have been developed. The Davos Assessment of Cognitive Biases Scale (DACOBS; van der Gaag et al., 2013) measures both cognitive biases and neurocognitive deficits that have been found to be associated with mental disorders. The cognitive distortions that the DACOBS measures are jumping to conclusions, belief inflexibility, external attribution bias, and selective attention for threat. Jumping to conclusions, or data gathering bias, is the tendency to arrive at conclusions or decisions based on first thoughts or intuition. Belief inflexibility is the unwillingness to change

conclusions, opinions, or decisions. External attribution is the tendency to blame others for any misfortune to oneself. Selective attention for threat is the tendency to pay excessive attention to or anticipate threats above other cues in the environment (van der Gaag et al., 2013). Because selective attention for threats is a symptom peculiar to delusion-related mental disorders such as schizophrenia (Lim et al., 2011; Moritz & Laudan, 2007; Phillips et al., 2000), with no record of extensive occurrence in people without paranoid psychosis, I chose to exclude this cognitive bias in the current study.

Moss-Morris and Petrie (1997) revised the Cognitive Errors Questionnaire (CEQ-R) to measure four types of cognitive errors: overgeneralization, selective abstraction, catastrophizing, and personalization. Overgeneralization is the tendency to make general assumptions based on isolated instances. Selective abstraction is the tendency to focus on an isolated detail and make interpretations about that detail without taking context into account. Catastrophizing is the tendency to interpret aversive events as disastrous and irreparable. Personalization is the tendency to link oneself to external events. These constructs were measured in two themes: General (i.e., relating to everyday life experiences) and Somatic (i.e., relating to individuals' bodily experiences). Moss-Morris and Petrie had a depressed group, a chronic fatigue syndrome group, a chronic pain group, and a healthy group take the questionnaire and found that the depressed group had a significantly higher score than the other three groups on the General CEQ-R. The Somatic CEQ-R scores of the chronic pain and chronic fatigue syndrome groups were significantly higher than that of the healthy group. Somatic CEQ-R had positive relationships with focus on self and symptoms of chronic pain or chronic fatigue, while General CEQ-R had positive correlations with depression and self-focusing and a significant negative correlation with self-esteem (Moss-Morris & Petrie, 1997).

One common type of cognitive distortion is dichotomous thinking—the tendency to think in clear oppositions and duality (Oshio, 2012). Among cognitive distortions, dichotomous thinking is easily detected through verbal expressions, such as, "This person is either good or bad." The Dichotomous Thinking Inventory (DTI), constructed by Oshio (2009), has three subscales, each of which represents a component of dichotomous thinking. The first component is preference for dichotomy, which refers to the tendency towards clarity and distinction and away from obscurity and ambiguity. The second subscale, dichotomous belief, refers to the belief that everything can be divided into two categories, such as black and white, good and evil, all or nothing, rather than accepting that certain things are inseparable or interdependent. The third component, profit-and-loss thinking, refers to the impulse to gain profits and avoid losses.

As a common cognitive distortion, dichotomous thinking had significant relationships with several mental disorders. Measuring individuals on the DTI and various other tests, Oshio (2009, 2012) found that total dichotomous thinking score had positive correlations with borderline personality disorder, narcissistic personality disorder, and all types of personality disorders, except for schizotypal. Dichotomous thinking was also identified as a potential mediating variable in the positive relationship between depression and body mass index (Antoniou et al., 2017). Egan et al. (2007) found a significant positive correlation between dichotomous thinking and negative perfectionism - the compulsion to achieve perfection that is associated with self-criticism and symptoms of several mental disorders (Egan et al., 2007; Shafran & Mansell, 2001). However, dichotomous thinking had no correlation with positive perfectionism - the drive for perfection that is associated with achievements and self-improvement (Egan et al., 2007). Dichotomous thinking has also been found to have associations with suicidal tendency. Suicidal patients in Litinsky & Haslam's (1998) study used dichotomous

languages to describe certain pictures in the Thematic Apperception Test (Murray, 1943) more frequently than did non-suicidal patients.

Given the associations of dichotomous thinking and other cognitive distortions with mental disorders and suicidal tendency, it is reasonable to expect that dichotomous thinking and certain other cognitive distortions may be co-occurring or co-developing and have statistically significant correlations. However, no known study has reported a correlation between dichotomous thinking and other types of cognitive distortions, nor has there been a deliberate attempt to examine such correlations. Some integrative measures of cognitive distortions, such as the Inventory of Cognitive Distortions (Yurica, 2002), even lack a subscale for dichotomous thinking. The current study attempts to examine the correlations between dichotomous thinking and the following cognitive distortions: jumping to conclusions, belief inflexibility, external attribution bias, overgeneralization, selective abstraction, catastrophizing, and personalization.

Method

Participants

There were 151 recruits, but only 126 participants (26 men, 99 women, and 1 identifying as other) fully completed the survey. All participants were 18 years or older, and age ranged from 18 to 61 (M = 22.02, SD = 5.94). The race-ethnicity make-up of the participants was: 63.49% White, 11.11% Hispanic, Latino, or Spanish origin, 9.52% Black, 2.38% Asian, 1.59% Native Hawaiian or other Pacific Islander, and 11.90% mixed or other races or ethnicities. Regarding highest level of education, 15.08% of participants had high school diploma or equivalent, 53.97% some college, 11.11% associate's degree, 11.11% bachelor's degree, 3.17% some post undergraduate work, 4.76% master's degree, and 0.79% doctorate degree. Regarding employment status, 10.32% of participants were employed-full time, 56.35% employed part-

time, and 33.33% unemployed. Participants were recruited online, through Facebook (in Student Survey Exchange and The Research Survey Exchange Group), Reddit (in r/samplesize), and Lindenwood Participant Pool (LPP). The LPP consists of Lindenwood University students enrolled in select social science courses that accept LPP credit—earned by participating in research studies approved by the Lindenwood Institutional Review Board—as extra credits. Participants who signed up for the current study through the LPP received one LPP credit, regardless of whether they complete the survey. As typical of online recruitment, the sampling method was non-probabilistic. The study was approved by Lindenwood Psychology Program Scientific Review Committee and by Lindenwood Institutional Review Board.

Materials and Measurements

The survey used in this study was built and conducted on Qualtrics, which allowed participants to complete the survey using desktops, laptops, smartphones, and other devices. The link to the survey was posted on Facebook, Reddit, and embedded in Lindenwood's Sona Systems for recruitment through Lindenwood Participant Pool. The survey incorporated the DTI (Oshio, 2009), three cognitive bias subscales—i.e., jumping to conclusions, belief inflexibility, and external attribution—from the DACOBS (van der Gaag et al., 2013) and four cognitive error subscales—i.e., overgeneralization, selective abstraction, catastrophizing, and personalization—from a simplified version of the General CEQ-R (Moss-Morris & Petrie, 1997).

Dichotomous Thinking Inventory

As mentioned, the DTI (Oshio, 2009) has three components, namely preference for dichotomy, dichotomous belief, and profit-and-loss thinking. In the original test, each component is measured by rating five items on a 6-point scale (1 = *disagree strongly*; 6 = *agree strongly*). The current study used a 7-point Likert scale so that participants had a choice in the middle.

Items describing preference for dichotomy include, "I want to clarify whether things are 'good' or 'bad'." Dichotomous belief is reflected by items such as, "All questions have either a right answer or a wrong answer." Profit-and-loss thinking is reflected by such items as, "I want to clarify whether things are beneficial to me or not." See Appendix A for the full inventory.

In Oshio's (2009) development, the DTI had good internal consistency (Cronbach's alpha = .84) and acceptable test-retest reliability (.81). Because the current study only surveyed each participant once, test-retest reliability did not apply. In the current study, the DTI's internal consistency was acceptable (Cronbach's alpha = .76), although lower than that observed in Oshio's (2009) development. Note that in Oshio's study, the 352 participants whose results were used for internal consistency test were Japanese undergraduates, while the 126 participants in the current study most likely lived in the United States (or other English-speaking countries) and were somewhat more diverse in terms of age and education level. Regarding each construct, in Oshio's development, preference for dichotomy had Cronbach's alpha of .81, dichotomous belief .74, and profit-and-loss thinking .75. In the current study, preference for dichotomy had Cronbach's alpha of .78, dichotomous belief .83, and profit-and-loss thinking .78. See Table 1 for internal consistencies of all tests used and constructs measured.

Davos Assessment of Cognitive Biases Scale

The DACOBS (van der Gaag et al., 2012) measures cognitive biases in tandem with cognitive limitations and safety behaviors that are often observed in people with psychosis. Each cognitive tendency was represented by six statements rated on a 7-point Likert scale (1 = *strongly disagree*; 7 = *strongly agree*). The current study was only interested in the measurements of three cognitive biases the DACOBS provides; namely, jumping to conclusions, belief inflexibility, and external attribution. Jumping to conclusions is the tendency to arrive at

conclusions or decisions based on first thoughts or intuition, without much effort to analyze evidence and facts. Statements describing this cognitive bias include, “The first thoughts are the right ones.” Belief inflexibility is the unwillingness to change conclusions, opinions, or decisions, described by statements such as, “I don't need to consider alternatives when making a decision.” The original DACOBS (van der Gaag et al., 2020) also included this item: “It's difficult to know what people are feeling by their facial expression.” However, I excluded this item in the current study because it seemed not relevant to belief inflexibility. External attribution is the tendency to blame others for any misfortune to oneself, represented by such statements as, “Things went wrong in my life because of other people.” I excluded the item, “I don't change my way of thinking easily,” in the original DACOBS because this item seemed not relevant to external attribution. See Appendix B for all items describing these three subscales used in this study.

The DACOBS (van der Gaag et al., 2012) had excellent internal consistency (Cronbach’s alpha = .90), excellent parallel forms reliability (split-half reliability = .92), and good test-retest reliability (.86). Regarding the interested constructs, van der Gaag et al. observed Cronbach’s alphas of .72 for jumping to conclusions, .74 for belief inflexibility, and .64 for external attribution. In the current study, jumping to conclusions had Cronbach’s alpha of .70, belief inflexibility .61, and external attribution .79. The subset of the DACOBS made up of three constructs had Cronbach’s alpha of .70 (see Table 1).

Cognitive Errors Questionnaire

The CEQ-R (Moss-Morris & Petrie, 1997) measured and compared four cognitive errors in daily experiences (General) and the same errors in bodily experiences (Somatic). These four cognitive errors include overgeneralization, selective abstraction, catastrophizing, and

personalization. Overgeneralization is the tendency to make general assumptions based on isolated instances; selective abstraction is the tendency to focus on an isolated detail and make interpretations about that detail without considering context; catastrophizing is the tendency to interpret aversive events as disastrous and irreparable; personalization is the tendency to link oneself to external events. Each cognitive error is represented by three vignettes, rated on a 5-point Likert scale (1 = *almost exactly like I would think*; 2 = *a lot like I would think*; 3 = *somewhat like I would think*; 4 = *a little like I would think*; 5 = *not at all like I would think*). The current study only chooses one vignette to describe each cognitive error in the General CEQ-R and omits the Somatic CEQ-R. To maximize mobile device friendliness, the Likert scale with description for each scale point was replaced by a bipolar 5-point scale, with 1 = *not at all like how I would think* and 5 = *exactly like how I would think*. See Appendix C for the vignettes used in this study. The General CEQ-R had good internal consistency (Cronbach's alpha = .90) in Moss-Morris and Petrie's (1997), compared to Cronbach's alpha of .73, as observed in the current sample. Because the current study used only one vignette to measure a construct of the General CEQ-R, internal consistency does not apply for each construct in the test.

Design

The survey consisted of a consent page, the DTI, the three subscales of the DACOBS, the General CEQ-R, a demographic questionnaire, and a debriefing statement. Items for the DTI (Oshio, 2009), DACOBS (van der Gaag et al., 2012), and General CEQ-R (Moss-Morris & Petrie, 1997) were randomized. Consenting participants answered the three mentioned cognitive distortions measures, then proceeded to answer demographic questions and were given a thank and debriefing letter in the end of the survey.

Analysis

Data were analyzed using IBM SPSS Statistics version 27.0. Pearson's correlations were performed to examine the relationships between dichotomous thinking and jumping to conclusions, belief inflexibility, external attribution bias, overgeneralization, selective abstraction, catastrophizing, personalization, and age. To account for multicollinearity among the cognitive constructs and age, and to identify factors that best predict dichotomous thinking, a stepwise regression analysis was conducted. A multivariate analysis of variance (MANOVA) was conducted to examine the post-hoc question of whether dichotomous thinking and the other seven cognitive distortions differed between men and women.

Results

Relationships between Dichotomous Thinking and Other Cognitive Distortions

A series of two-tailed Pearson's correlation analyses were conducted to examine whether dichotomous thinking was related to the other measured cognitive distortions. The results revealed that total dichotomous thinking score had statistically significant weak positive correlations with jumping to conclusions, $r(124) = .28$, $p = .002$; belief inflexibility, $r(124) = .35$, $p < .001$; external attribution, $r(124) = .29$, $p = .001$; and a very weak positive correlation with selective abstraction, $r(124) = .18$, $p = .04$. Age had a statistically significant weak negative correlation with total dichotomous thinking score, $r(124) = -.23$, $p = .009$. Regarding the components of dichotomous thinking, preference for dichotomy had weak positive correlations with external attribution, $r(124) = .20$, $p = .023$ and selective abstraction, $r(124) = .21$, $p = .02$. Profit-and-loss thinking had a weak positive correlation with jumping to conclusions, $r(124) = .20$, $p = .027$. Dichotomous belief had moderate positive correlations with jumping to conclusions, $r(124) = .43$, $p < .001$; belief inflexibility, $r(124) = .56$, $p < .001$; weak positive

correlations with external attribution, $r(124) = .34$, $p < .001$; selective abstraction, $r(124) = .20$, $p = .03$; very weak positive correlation with overgeneralization, $r(124) = .18$, $p = .047$; and a weak negative correlation with age, $r(124) = -.31$, $p < .001$. Dichotomous belief was the main driver of the correlations between total dichotomous thinking score and jumping to conclusions, belief inflexibility, external attribution, and age. See Table 2 for all observed correlations in a correlation matrix.

Linear Regression Models to Predict Dichotomous Thinking

While total dichotomous thinking score had correlations with four of the seven measured constructs and with age, correlations were also found among these seven constructs and age (see Table 2). To account for collinearity and single out factors that best predict dichotomous thinking, I performed a linear stepwise regression analysis on SPSS with the total dichotomous thinking score as the dependent variable, while independent variables included the seven constructs and age (see Table 3 for regression output). Note that the three components of dichotomous thinking were not included as independent variables because their naturally high correlations with the dependent variable (total dichotomous thinking score) would overstate multicollinearity statistics if included in the regression analysis. After adjusting for multicollinearity, the analysis retained two variables that were most correlated with dichotomous thinking: belief inflexibility, $r(124) = .35$, $p < .001$ and age, $r(124) = -0.23$, $p = .009$. The model that contained only belief inflexibility ($y = 44.51 + 1.23 \times$ *belief inflexibility*) could predict 12.4% of the variability in dichotomous thinking scores, $R^2 = .124$, *adjusted* $R^2 = .117$, $p < .001$, $F(1,124) = 17.56$. The model that included both age and race-ethnicity ($y = 55.50 + 1.11 \times$ *belief inflexibility* $- 0.44 \times$ *age*) could account for 15.2% of the dichotomous thinking scores, $R^2 = .152$, *adjusted* $R^2 = .138$, $p = .046$, $F(2,123) = 4.08$ (see Table 3). Notably, the excluded

variables did not demonstrate too high collinearity. For example, in the second model, the lowest tolerance value was .67, and the highest variance inflation factor (VIF) was 1.49, as observed for the variable external attribution (see Table 4 for all collinearity statistics of both models).

Comparing Men and Women on Cognitive Distortions

After collecting data, I formed a post-hoc question of whether men and women differ on any of the cognitive distortions (dichotomous thinking, jumping to conclusion, belief inflexibility, external attribution bias, overgeneralization, selective abstraction, catastrophizing, personalization). In order to test for gender differences, I conducted a MANOVA with gender as the independent variable (excluding one identifying as other) and the eight cognitive distortion measures as the dependent variables. The results of the multivariate analysis revealed no statistically significant difference between men and women on the overall set of cognitive distortions, $F(8,116) = 1.02$, $p = .43$; *Pillai's Trace* = .07, *partial* $\eta^2 = .07$. However, the results of the univariate tests hint of a potential gender difference for belief inflexibility ($M_{men} = 13.96$, $M_{women} = 12.09$; $F[1,123] = 3.97$, $p = .049$, *partial* $\eta^2 = .03$) and possibly jumping to conclusions ($M_{men} = 23.62$, $M_{women} = 21.27$; $F[1,123] = 3.54$, $p = .06$, *partial* $\eta^2 = .03$), if the sample size were increased (see Table 5).

Discussion

That dichotomous thinking positively correlated with jumping to conclusion, belief inflexibility, external attribution, and selective abstraction supported the hypothesis that dichotomous thinking should correlate with at least one of the seven other cognitive distortions. The correlations between dichotomous thinking, jumping to conclusions, and belief inflexibility were expected. Theoretically, any of these three tendencies can lead to another, or all three can develop at the same time, although no known causal or longitudinal study has supported these

theories. Further investigations could be done to examine which of the three is most likely the root cause of the other two.

The positive correlation between dichotomous thinking and external attribution can be explained by the following theory. If it is true that most people tend to attribute the causes of events to dispositions (internal factors), rather than situations (Heider, 1958; Ross, 1977), then those who think dichotomously would see mainly two causes of an adverse incident: either themselves or other people are to blame for the incident. According to the self-serving bias theory (Larson, 1977), chances are these individuals will attribute the adverse incidents to other people, instead of themselves. This theory is consistent with the lack of a positive correlation between dichotomous thinking and personalization, which can be considered the opposite of external attribution. While individuals with high degree of dichotomous thinking see two choices of either blaming themselves or others, they tend to choose blaming others, which may have resulted in a positive correlation between dichotomous thinking and external attribution but no correlation between dichotomous thinking and personalization.

The positive correlation between dichotomous thinking and selective abstraction was weak and mostly driven by the positive correlation between preference for dichotomy and selective abstraction. A preference for clarity could explain the behavior of singling out details from context. I found no past research that looked specifically into the relationship between selective abstraction and preference for dichotomy or clarity, so future research could examine potential relationships between these two tendencies.

Of the components of dichotomous thinking, dichotomous belief correlated strongly with the same four cognitive distortions with which total DTI score had correlations (namely jumping to conclusions, belief inflexibility, external attribution, and selective abstraction). Dichotomous

belief also had weak positive correlations with overgeneralization. That dichotomous belief drove the relationships between total DTI score and other factors was consistent with Oshio's (2012) findings. Oshio reported that preference for dichotomy correlated with clusters B and C of personality disorders (totaling 7 personality disorders), profit-and-loss thinking with 1 (i.e., avoidant personality disorder), and dichotomous belief with all 10 personality disorders.

After adjusting for multicollinearity via a stepwise linear regression analysis, belief flexibility emerged as the single construct that best predicted dichotomous thinking. If dichotomous thinking can be viewed as a hallmark or necessity of political extremity, then this finding that belief inflexibility best explained the variance of dichotomous thinking corroborates with found evidence that lower cognitive flexibility levels were associated with partisan extremity, regardless of political orientation (Zmigrod et al., 2020). Future studies can examine whether manipulating belief inflexibility could influence dichotomous thinking or vice versa.

The current study had typical limitations of online studies: non-probability sampling and limited generalizability. Additionally, the requested demographic information was not sufficient to build a meaningful model that could predict degree of dichotomous thinking. Although no causal claim can be made following this study, the observed correlations suggested theories and questions for further investigations. Future studies can zoom into examining potential causal, mediating, or moderating relationships between dichotomous thinking, jumping to conclusion, belief inflexibility, external attribution bias, and selective abstraction.

References

Antoniou, E. E., Bongers, P., & Jansen, A. (2017). The mediating role of dichotomous thinking and emotional eating in the relationship between depression and BMI. *Eating Behaviors, 26*, 55-60. https://doi.org/10.1016/j.eatbeh.2017.01.007

Barriga, A. Q., Landau, J. R., Stinson, B. L., Liau, A. K., & Gibbs, J. C. (2000). Cognitive distortion and problem behaviors in adolescents. *Criminal Justice and Behavior*, *27*(1), 36–56. https://doi.org/10.1177/0093854800027001003

Cosenza, M., & Nigro, G. (2015). Wagering the future: Cognitive distortions, impulsivity, delay discounting, and time perspective in adolescent gambling. *Journal of Adolescence*, *45*, 56–66. https://doi.org/10.1016/j.adolescence.2015.08.015

Egan, S. J., Piek, J. P., Dyck, M. J., & Rees, C. S. (2007). The role of dichotomous thinking and rigidity in perfectionism. *Behaviour Research and Therapy, 45*(8), 1813-1822. https://doi.org/10.1016/j.brat.2007.02.002

Jager-Hyman, S., Cunningham, A., Wenzel, A., Mattei, S., Brown, G. K., & Beck, A. T. (2014). Cognitive distortions and suicide attempts. *Cognitive Therapy and Research, 38*(4), 369-374. http://dx.doi.org/10.1007/s10608-014-9613-0

Heider, F. (1958). *The psychology of interpersonal relations*. Wiley.

Larson, J. R., Jr. (1977). Evidence for a self-serving bias in the attribution of causality. *Journal of Personality*, *45*, 430-441. 10.1111/j.1467-6494.1977.tb00162.x

Lim, M., Gleeson, J. F., & Jackson, H. J. (2011). Selective attention to threat bias in delusion-prone individuals. *Journal of Nervous and Mental Disease*, *199*(10), 765-772. http://doi.org/10.1097/NMD.0b013e31822fc9e9

Litinsky, A. M., & Haslam, N. (1998). Dichotomous thinking as a sign of suicide risk on the TAT. *Journal of Personality Assessment, 71*(3), 368-378. http://doi.org/10.1207/s15327752jpa7103_6

Moritz, S., & Laudan, A. (2007). Attention bias for paranoia-relevant visual stimuli in schizophrenia. *Cognitive Neuropsychiatry*, *12*(5), 381-390. https://doi.org/10.1080/13546800601119982

Moss-Morris, R., & Petrie, K. J. (1997). Cognitive distortions of somatic experiences: Revision and validation of a measure. *Journal of Psychosomatic Research*, *43*, 293-306. https://doi.org/10.1016/S0022-3999(97)00020-2

Murray, H. A., & Harvard University. (1943). *Thematic Apperception Test manual*. Harvard University Press.

Oshio, A. (2009). Development and validation of the dichotomous thinking inventory. *Social Behavior and Personality: An International Journal, 37*(6), 729-741. http://doi.org/10.2224/sbp.2009.37.6.729

Oshio, A. (2012). An all-or-nothing thinking turns into darkness: Relations between dichotomous thinking and personality disorders: Dichotomous thinking and personality disorders. *Japanese Psychological Research, 54*(4), 424-429. http://doi.org/10.1111/j.1468-5884.2012.00515.x

Phillips, M. L., Senior, C., & David, A.S. (2000). Perception of threat in schizophrenics with persecutory delusions: An investigation using visual scan paths. *Psychological Medicine*, *30*(1), 157-167. http://doi.org/10.1017/S0033291799001397

Ross, L. (1977). The intuitive psychologist and his shortcomings: Distortions in the attribution process. *Advances in Experimental Social Psychology*, *10*, 173-220. https://doi.org/10.1016/S0065-2601(08)60357-3

Shafran, R., & Mansell. W. (2001) Perfectionism and psychopathology: A review of research and treatment. *Clinical Psychology Review*, *21*(6), 879-906. https://doi.org/10.1016/S0272-7358(00)00072-6

van der Gaag, M., Schütz, C., ten Napel, A., Landa, Y., Delespaul, P., Bak, M., Tschacher, W., & de Hert, M. (2013). Development of the Davos Assessment of Cognitive Biases Scale (DACOBS). *Schizophrenia Research*, *144*(1-3), 63-71. https://doi.org/10.1016/j.schres.2012.12.010

Yurica, C. L. (2002). *Inventory of Cognitive Distortions: Development and validation of a psychometric test for the measurement of cognitive distortions*. [Unpublished doctoral dissertation]. Philadelphia College of Osteopathic Medicine.

Zmigrod, L., Rentfrow, P. J., & Robbins, T. W. (2020). The partisan mind: Is extreme political partisanship related to cognitive inflexibility? *Journal of Experimental Psychology: General, 149*(3), 407–418. https://doi.org/10.1037/xge0000661

Appendix A

Dichotomous Thinking Inventory (Oshio, 2009)

Preference for Dichotomy

1. All things work out better when likes and dislikes are clear.
2. It works out best when even ambiguous things are made clear-cut.
3. I dislike ambiguous attitudes.
4. I want to clarify whether things are "good" or "bad."
5. I prefer it when boundaries are clear for all things.

Dichotomous Belief

6. There are only "winners" and "losers" in this world.
7. I think all people can be divided into "winners" or "losers."
8. People can clearly be distinguished as being "good" or "bad."
9. All questions have either a right answer or a wrong answer.
10. I think of everyone as being either my friend or my enemy.

Profit-and-Loss Thinking

11. I want to clearly distinguish what is safe and what is dangerous.
12. Information should be defined as either true or false.
13. I want to clarify whether things are beneficial to me or not.
14. I prefer to classify information as being useful or useless for me.
15. It is best when competitions have clear outcomes.

Appendix B

Jumping to Conclusion, Belief Inflexibility, and External Attribution

from the Davos Assessment of Cognitive Biases Scale (van der Gaag et al., 2013)

Jumping to Conclusion

1. I don't need long to reach a conclusion.
2. The right conclusion often pops in my mind.
3. I quickly find evidence to support my beliefs.
4. I make decisions faster than other people.
5. The first thoughts are the right ones.
6. I don't need to evaluate all the facts to reach a conclusion.

Belief Inflexibility

7. I don't need to consider alternatives when making a decision.
8. When I have a goal, I don't know how to reach it.
9. There is usually only one explanation for a single event.
10. I don't need to look for additional information when making a decision.
11. I avoid considering information which will disconfirm my beliefs.

External Attribution

12. Things went wrong in my life because of other people.
13. It's NOT my fault when things go wrong in my life.
14. People don't give me a chance to do well.
15. People make my life miserable.
16. People treat me badly for no reason.

Appendix C

Cognitive Errors Questionnaire – General (Moss-Morris & Petrie, 1997)

Instructions: Please rate the following thoughts on the extent to which they resemble the way you would think given the same situations (1 = Not at all like how I would think; 5 = Exactly like how I would think).

1. **Overgeneralization**

Recently, a number of your friends are learning to play tennis. You would like to learn but remember the difficulty you had the time you tried to ski. You think to yourself, "I was useless at skiing so I doubt if I can learn to play tennis."

2. **Selective Abstraction**

You met with your boss today to discuss how you have been doing in your job. (S)he says that you were doing a really good job but asked you to improve in one small area. You think to yourself, "(S)he really thinks I am doing a lousy job."

3. **Catastrophizing**

You have an argument with a friend. When she doesn't call you as usual during the week, you think, "Our friendship is ruined, and she doesn't want to speak to me again."

4. **Personalization**

You played golf for the first time today with some of your friends who play regularly. Everybody seemed a bit disappointed with their play, and the group seemed a bit subdued on the way home. You thought to yourself, "I guess I held them back and spoiled the game for them."

Table 1

Internal Consistencies (Cronbach's Alphas) for Tests and Constructs

	Current Study	Oshio (2009)	Van der Gaag et al. (2012)	Moss-Morris & Petrie (1997)
Dichotomous thinking	.76	.84		
Preference for Dichotomy	.78	.81		
Dichotomous belief	.83	.74		
Profit-and-Loss Thinking	.78	.75		
Full DACOBS			.90	
Three-question DACOBS	.70			
Jumping to conclusion	.70		.72	
Belief inflexibility	.61		.74	
External attribution	.79		.64	
General CEQ-R	.73			.90

Table 2

Correlation Matrix Among Dichotomous Thinking, Its Components, Seven Other Cognitive Distortions, and Age

Measure	1	2	3	4	5	6	7	8	9	10	11
1. Dichotomous thinking											
2. Preference for dichotomy	.821***										
3. Dichotomous belief	.807***	.437***									
4. Profit-and-loss thinking	.851***	.636***	.507***								
5. Jumping to conclusion	.275**	.021	.430***	.197*							
6. Belief inflexibility	.352***	.100	.558***	.170	.566**						
7. External attribution	.287**	.203*	.336***	.155	.277**	.564**					
8. Overgeneralization	.105	.078	.177*	-.010	.001	.364***	.383***				
9. Selective abstraction	.181*	.207*	.197*	.036	.038	.254**	.316***	.444***			
10. Catastrophizing	.108	.124	.116	.023	-.027	.274**	.288**	.432**	.423***		
11. Personalization	.052	.125	.029	-.025	.027	.117	.314**	.365***	.357***	.399**	
12. Age	-.230**	-.128	-.313***	-.109	-.095	-.186*	.003	.022	.116	.131	.096

Note: This table demonstrates two-tail Pearson's correlation coefficients among dichotomous thinking, its components, seven other cognitive distortions, and age.

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

***. Correlation is significant at the 0.001 level (2-tailed)

Table 3

Stepwise Linear Regression Results Using Dichotomous Thinking as Dependent Variable and Seven Cognitive Constructs and Age as Independent Variables

Model	Predictor	*B*	*B* 95% CI [LL, UL]	Std. Error	*β*	sr^2	Sig.	*F*	*R*	R^2	*Adjusted* R^2
1	(Intercept)	44.509	[36.844, 52.174]	3.873			.000	17.566	.352	.124	.117
	Belief inflexibility	1.234	[0.651, 1.816]	0.294	.352	.124	.000				
2	(Intercept)	55.502	[68.258, 94.448]	6.654			.000	4.077	.390	.152	.138
	Belief inflexibility	1.122	[-0.965, -0.081]	0.296	.320	.099	.000				
	Age	-0.436	[-3.178, -0.009]	0.216	-.171	.028	.046				

Note: The table shows unstandardized coefficients (*B*), lower limits (LL) and upper limits (UL) of confidence interval, standardized coefficients (*β*), semi-partial correlation squared (sr^2), significance of coefficients (Sig.), F-value of models' significance (F), the models' correlation coefficients (*R*), coefficients of determination (R^2), and coefficients of determination adjusted for number of predictors (adjusted R^2).

Table 4

Partial Correlations and Collinearity Statistics of Variables in Two Linear Regression Models

Model						Collinearity Statistics		
		β	*t*	Sig.	Partial Correlation	Tolerance	VIF	Minimum Tolerance
1	Jumping to conclusion	.111	1.089	.278	.098	.679	1.472	.679
	External attribution	.130	1.281	.203	.115	.682	1.465	.682
	Belief inflexibility	.352	4.191	.000	352	1.000	1.000	
	Generalization	-.026	-.290	.772	-.026	.868	1.153	.868
	Selective Abstraction	.098	1.129	.261	.101	.935	1.069	.935
	Catastrophizing	.012	.141	.888	.013	.925	1.081	.925
	Personalization	.011	.125	.901	.011	.986	1.014	.986
	Age	-.171	-2.019	.046	-.179	.965	1.036	.965
2	Jumping to conclusion	.114	1.129	.261	.102	.679	1.472	.662
	External attribution	.160	1.585	.115	.142	.670	1.492	.647
	Belief inflexibility	.320	3.792	.000	.315	.965	1.036	
	Generalization	-.009	-.097	.923	-.009	.859	1.164	.830
	Selective Abstraction	.132	1.518	.132	.136	.908	1.102	.888
	Catastrophizing	.048	.540	.590	.049	.890	1.123	.874
	Personalization	.031	.371	.711	.034	.972	1.029	.947
	Age	-.171	-2.019	.046	-.168	.965	1.036	

Note: Model 1's predictor was belief inflexibility. Model 2's predictors were belief inflexibility and age. For each model, the table show standardized coefficient (*β*), *t*-statistics (*t*), significance of coefficients (Sig.), partial correlation value, tolerance, variance inflation factor (VIF), and minimum tolerance.

Table 5

Means, Standard Deviations, and Tests of Between-Subjects Effects of Gender on Cognitive Distortions

Measure	Male (N = 26)		Female (N = 99)		Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
	M	*SD*	*M*	*SD*						
Dichotomous thinking	62.27	16.68	59.53	14.52	155.046	1	155.046	0.690	.408	.006
Jumping to conclusion	23.62	5.17	21.27	5.77	113.01	1	113.01	3.541	.062	.028
Belief inflexibility	13.96	4.73	12.09	4.14	72.057	1	72.057	3.965	.049	.031
External attribution	14.04	6.61	13.51	5.36	5.639	1	5.639	0.178	.674	.001
Overgeneralization	2.04	1.08	1.69	1.02	2.546	1	2.546	2.404	.124	.019
Selective abstraction	2.07	1.87	0.93	1.08	0.893	1	0.893	0.801	.373	.006
Catastrophizing	2.38	2.40	1.20	1.22	0.008	1	0.008	0.005	.942	.000
Personalization	2.31	2.29	1.29	1.26	0.004	1	0.004	0.003	.958	.000

Note: This table shows mean scores and standard deviations of men and women on eight measured cognitive distortions and results of univariate tests of the effect of gender on the differences between men's and women's scores. Type III sum of square calculates the sum of squared deviations from the mean between men and women to measure how far observations deviate from the mean, adjusting for uneven group sizes. Mean square, or total variability, is sum of squares divided by degree of freedom (*df*). Partial eta squared represents the effect size of gender on the differences between men and women.