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## Relationships between Dichotomous Thinking and Other Cognitive Distortions

Nam Nguyen<sup>§</sup>


**Introduction.** Both dichotomous thinking and other types of cognitive distortions have been found to be associated with various mental disorders and suicidality. There has been no known study that examines the relationship between dichotomous thinking and other cognitive distortions, nor known measure of cognitive distortions that integrates dichotomous thinking.

**Objective.** This study aims to examine the relationships between dichotomous thinking and seven other cognitive distortions, namely jumping to conclusion, belief inflexibility, external attribution bias, overgeneralization, selective abstraction, catastrophizing, and personalization. **Method.** A survey was distributed online, integrating measures for dichotomous thinking from the Dichotomous Thinking Inventory (Oshio, 2009), jumping to conclusion, belief inflexibility, and external attribution bias from the Davos Assessment of Cognitive Biases Scale (van der Gaag et al., 2012), , overgeneralization, selective abstraction, catastrophizing, and personalization from the Cognitive Errors Questionnaire (Moss-Morris & Petrie, 1997). **Results.** Dichotomous thinking had significant positive correlations with jumping to conclusion, belief inflexibility, and external attribution. Age had a negative correlation with dichotomous thinking and belief inflexibility. Men and women did not differ significantly on cognitive distortions. Among demographic variables, age best predicted the degree of dichotomous thinking. **Conclusions.** Dichotomous thinking seemed to have co-occurred or co-developed with jumping to conclusion, belief inflexibility, and external attribution. Further investigations can focus on potential causal, mediating, or moderating relationships among these four constructs.

**Keywords:** cognitive distortions, dichotomous thinking, jumping to conclusion, belief inflexibility, external attribution bias, overgeneralization, selective abstraction, catastrophizing, personalization.

Cognitive distortions – various types of biases and errors in thinking – have been found to have 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.

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Several measures of various types of cognitive distortions have been developed. The Davos Assessment of Cognitive Biases Scale (DACOBS; van der Gaag et al., 2012) measures both cognitive biases and neurocognitive deficits that have been found to be associated with mental disorders. Unlike cognitive biases, which are theorized as learned cognitive-behavioral habits (Beck, 2011), neurocognitive deficits are cognitive limitations that are most likely caused by physiological malfunctions of the nervous system (van der Gaag et al., 2012). The cognitive distortions that the DACOBS measures are jumping to conclusions, belief inflexibility, external attribution bias, and selective attention for threat. Jumping to conclusion, or data gathering bias, is the tendency to arrive at conclusions or decisions based on first thoughts or intuition, without much effort to analyze evidence and facts. 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., 2012). 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 choose 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 makes interpretation 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 distortions is dichotomous thinking – the tendency to think in clear oppositions and duality (Oshio, 2012). Dichotomous thinking has various components and manifests itself in different ways. 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.

Dichotomous thinking has been found to have 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. Of the three components of DTI, preference for dichotomy had significant positive correlations with clusters B and C of personality disorders; dichotomous belief had significant positive relationships with all types of personality disorders, and profit-and-loss thinking had no significant relationship with any personality disorder but avoidant (Oshio, 2012). 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 lacks a subscale for dichotomous thinking. The current study attempts to examine the correlations between dichotomous thinking

and the following cognitive distortions: jumping to conclusion, belief inflexibility, external attribution bias, overgeneralization, selective abstraction, catastrophizing, and personalization.

## Method

### Participants

There were 151 people who consented to participate, 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/sampleize), and Lindenwood Participant Pool (LPP). The LPP consists of Lindenwood University students enrolled in select social science courses that accept LPP credits - 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 LLP credit, regardless of whether they complete the survey. Because recruitment was online, where certain individuals visit certain platforms or websites, the sampling method was non-probabilistic. The current study was approved by Lindenwood Psychology Program Scientific

Review Committee on February 14, 2020 and by Lindenwood Institutional Review Board on February 18, 2020.

### **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 Dichotomous Thinking Inventory (DTI; Oshio, 2009), three cognitive bias subscales – i.e. jumping to conclusion, belief inflexibility, and external attribution - from the Davos Assessment of Cognitive Biases Scale (DACOBS; van der Gaag et al., 2012), and four cognitive error subscales – i.e. overgeneralization, selective abstraction, catastrophizing, and personalization - from a simplified version of the Cognitive Errors Questionnaire (CEQ; 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.

### ***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 conclusion, belief inflexibility, and external attribution. Jumping to conclusion 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.

### ***Cognitive Errors Questionnaire***

The CEQ (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 makes interpretation 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 and omit the Somatic CEQ. 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.

### **Design**

The survey consisted of a consent page, the DTI, the three subscales of the DACOBS, the General CEQ, a demographic questionnaire (see Appendix D), and a debriefing statement, in that order. Items for the DTI (Oshio, 2009), DACOBS (van der Gaag et al., 2012), and General CEQ (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 SPSS. Pearson's correlations were performed to examine the relationships between dichotomous thinking and jumping to conclusion, belief inflexibility, external attribution bias, overgeneralization, selective abstraction, catastrophizing,

personalization, and age. 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. A stepwise regression analysis was conducted to build a model that predicts the degree of dichotomous thinking based on the collected demographic information, i.e. gender, age, race-ethnicity, education, and employment status.

## 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 conclusion,  $r(124) = 0.275, p = 0.002$ , belief inflexibility,  $r(124) = 0.352, p < 0.001$ , external attribution,  $r(124) = 0.287, p = 0.001$ , and selective abstraction,  $r(124) = 0.181, p = 0.042$ . Age had a statistically significant negative correlation with total dichotomous thinking score,  $r(124) = -0.23, p = 0.009$ . Regarding the components of dichotomous thinking, preference for dichotomy had statistically significant positive correlations with external attribution,  $r(124) = 0.203, p = 0.023$ , and selective abstraction,  $r(124) = 0.207, p = 0.02$ . Profit-and-loss thinking had a weak positive correlation with jumping to conclusion,  $r(124) = 0.197, p = 0.027$ . Dichotomous belief had statistically significant moderate positive correlations with jumping to conclusion,  $r(124) = 0.43, p < 0.001$ , belief inflexibility,  $r(124) = 0.558, p < 0.001$ , external attribution,  $r(124) = 0.336, p < 0.001$ , weak positive correlations with overgeneralization,  $r(124) = 0.177, p = 0.047$ , selective abstraction,  $r(124) = 0.197, p = 0.027$ , and a moderate negative correlation with age,  $r(124) = -0.313, p < 0.001$ ). Dichotomous belief was the main driver of the correlations between total dichotomous thinking score and jumping to

conclusion, belief inflexibility, external attribution, and age. See Table 1 for all observed correlations in a correlation matrix.

### **Comparing Men and Women on Cognitive Distortions**

After collecting data, I had 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 differences between men and women on the overall set of cognitive distortions,  $F(8,116) = 1.015, p = 0.428$ ; *Pillai's Trace* = 0.065, *partial*  $\eta^2 = 0.065$ . However, the results of the univariate tests hint of a potential gender difference for belief inflexibility ( $M_{men} = 13.96, M_{women} = 12.09$ ;  $F[1,123] = 3.965, p = 0.049, partial \eta^2 = 0.031$ ) and possible jumping to conclusion ( $M_{men} = 23.62, M_{women} = 21.27$ ;  $F[1,123] = 3.541, p = 0.062, partial \eta^2 = 0.028$ ) if the sample size were increased (see Table 2).

### **Linear Regression Models to Predict Dichotomous Thinking**

With demographic data available after data collection, I attempted to build a model to predict dichotomous thinking score based on demographic variables, i.e. gender, age, race/ethnicity, highest education level, and employment status. Stepwise linear regression was performed on SPSS (see Appendix G for regression output). After adjusting for multicollinearity, the analysis retained two variables that were most correlated with dichotomous thinking: age,  $r(124) = -0.23, p = 0.009$ , and race-ethnicity,  $r(124) = -0.204, p = 0.022$ . The model that contained age ( $y = 72.813 - 0.589 \times age$ ) could predict 5.3% of the variability in dichotomous

thinking scores,  $R^2 = 0.053$ ,  $p = 0.009$ ,  $F(1,124) = 6.947$ . The model that included both age and race-ethnicity ( $y = 81.353 - 0.523 \times age - 1.594 \times race/ethnicity$ ) could account for 8.3% of the dichotomous thinking scores,  $R^2 = 0.083$ ,  $p = 0.005$ ,  $F(2,123) = 5.538$  (see Table 3). Note that for the second model to work, race/ethnicity was arranged in the following order: 1 = *American Indian or Alaska Native*, 2 = *Asian*, 3 = *Black or African American*, 4 = *Hispanic, Latino, or Spanish Origin*, 5 = *Middle Eastern or North African*, 6 = *Native Hawaiian or Other Pacific Islander*, 7 = *White or European American*, 8 = *Mixed or Other* (see Appendix D).

### Discussion

That dichotomous thinking positively correlates with jumping to conclusion, belief inflexibility, and external attribution 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 conclusion, and belief inflexibility were expected.

Theoretically, any of these three tendencies can lead to another, or all three can develop at the same time. Further investigations need to 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 stronger with the same four cognitive distortions that total DTI score had correlations with (namely jumping to conclusion, 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 seven personality disorders, profit-and-loss thinking with one, and dichotomous belief with all 10 personality disorders.

Regarding the linear models to predict dichotomous thinking based on demographic variables, although the model that included both age and race/ethnicity ( $R^2 = 0.083$ ) could account for more variability in dichotomous thinking score than the model that had only age ( $R^2 = 0.053$ ), race/ethnicity does not have strong theoretical basis to be a predictor for a cognitive tendency. Firstly, race/ethnicity is a nominal variable, and the numerical order of race/ethnicity

used for analysis was simply alphabetical. Secondly, the examined sample has no representative who is American Indian or Alaska Native or Middle Eastern or North African (i.e. lacking level 1 and 5). Thirdly, 63.49% of participants were White or European American, coincidentally corresponding to level 7, which would be high in an ordinal or ratio scale with eight levels. This phenomenon possibly explains the “correlation” between race/ethnicity and dichotomous thinking. To predict degree of dichotomous thinking, therefore, the model that includes only age would be more reliable in other data sets. Theoretically, the older people get, the more they observe and learn that not everything can be divided in two extremes (i.e. dichotomous belief), or the less they seek for clear-cut answers (i.e. preference for dichotomy), and the less they think dichotomously.

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.

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## 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."

**Appendix D**  
**Demographic Questions and Numerical Coding**

Q9 Please identify your gender.

- Male (1)
- Female (2)
- Other (3) \_\_\_\_\_

Q10 What is your age in years?

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Q11 What is your race/ethnicity? (mark all that apply)

- American Indian or Alaska Native (1)
- Asian (2)
- Black or African American (3)
- Hispanic, Latino, or Spanish Origin (4)
- Middle Eastern or North African (5)
- Native Hawaiian or Other Pacific Islander (6)
- White or European American (7)
- Other, please specify (8) \_\_\_\_\_

Q12 What is your highest level of education completed?

- Some high school (1)
- High school diploma or equivalent (2)

- Vocational training (3)
- Some college (4)
- Associate's degree (e.g., AA, AE, AFA, AS, ASN) (5)
- Bachelor's degree (e.g., BA, BBA, BFA, BS) (6)
- Some post undergraduate work (7)
- Master's degree (e.g., MA, MBA, MFA, MS, MSW) (8)
- Specialist degree (e.g., EdS) (9)
- Doctorate degree (e.g., EdD, PhD, MD, PsyD, DDC, DDS, JD, PharmD) (10)
- Other, please specify (11) \_\_\_\_\_

Q13 What is your current employment status?

- Employed, full-time (1)
- Employed, part-time (2)
- Unemployed (3)
- Retired (4)

**Table 1**

*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 2**

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

Measure	Male (N = 26)		Female (N = 99)		Type III		Mean Square	F	Sig.	Partial Eta Squared
					Sum of Squares	Df				
	M	SD	M	SD						
Dichotomous thinking	62.27	16.68	59.53	14.52	155.046	1	155.046	0.690	0.408	0.006
Jumping to conclusion	23.62	5.17	21.27	5.77	113.01	1	113.01	3.541	0.062	0.028
Belief inflexibility	13.96	4.73	12.09	4.14	72.057	1	72.057	3.965	0.049	0.031
External attribution	14.04	6.61	13.51	5.36	5.639	1	5.639	0.178	0.674	0.001
Overgeneralization	2.04	1.08	1.69	1.02	2.546	1	2.546	2.404	0.124	0.019
Selective abstraction	2.07	1.87	0.93	1.08	0.893	1	0.893	0.801	0.373	0.006
Catastrophizing	2.38	2.40	1.20	1.22	0.008	1	0.008	0.005	0.942	0.000
Personalization	2.31	2.29	1.29	1.26	0.004	1	0.004	0.003	0.958	0.000

*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.

**Table 3**

*Stepwise Linear Regression Results Using Dichotomous Thinking as Dependent Variable and Demographic Variables as Independent Variables*

Model	Predictor	B		Std. Error	$\beta$	$sr^2$	Sig.	F	R	$R^2$	Adjusted $R^2$
		B	95% CI [LL, UL]								
1	(Intercept)	72.813	[62.727, 82.900]	5.096			0.000	6.947	0.230	0.053	0.045
	Age	-0.589	[-1.031, -0.147]	0.223	-0.230	0.0529	0.009				
2	(Intercept)	81.353	[68.258, 94.448]	6.616			0.000	5.538	0.287	0.083	0.068
	Age	-0.523	[-0.965, -0.081]	0.223	-0.205	0.0429	0.021				
	Race_Ethnicity	-1.594	[-3.178, -0.009]	0.801	-0.174	0.0313	0.049				

*Note:* The table shows unstandardized coefficients (*B*), lower limits (LL) and upper limits (UL) of confidence interval, standardized coefficients ( $\beta$ ), 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  $R^2$ ).