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The link between critical thinking and personality: individual differences in a concern for truth

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Abstract

This study explored the relation between a concern for truth (a measure of critical thinking disposition), the big five personality traits, and demographic variables. College students (*N* = 367, 75% women) completed an online survey that assessed a concern for truth and personality. Correlational analysis indicated a concern for truth was significantly related to openness, neuroticism, and agreeableness. Stepwise multiple regression analysis showed that openness, age, grade point average (GPA), neuroticism, and class rank were significant predictors of a concern for truth. Openness was the most significant predictor of a concern for truth and accounted for 13% of the variance between students. Implications of these findings in relation to critical thinking education and future research are discussed.

Keywords: truth-seeking, personality, critical thinking dispositions

The link between critical thinking and personality: individual differences in a concern for truth

Critical Thinking (CT) informs decision-making about what is reasonable for an individual to believe and do (Ennis, 1987) and is therefore a liberating factor in one's personal and civic life. As such, the development of CT in students is an explicit goal of contemporary education systems across the world, which is outlined in university mission statements, standards of accreditation, and government policy in the United States (Facione et al., 1995, US Congress, 1994). Moreover, research suggests CT predicts a variety of real-world outcomes (e.g. wellbeing and negative life events) better than measures of cognitive ability (Butler et al., 2017; Grossmann et al., 2013).

The digital revolution ushered in the age of information, and disinformation along with it. Private and political interests jockey to maintain the general public's attention to serve their own agenda, seeking to sway attitudes, beliefs, and behavior, often via misleading and intellectually dishonest propaganda. For instance, a Russian disinformation campaign has long sought to influence election outcomes in democracies around the world by sowing confusion and discord. The objective is to foster distrust in those institutions the general public relies on to discern facts – scientific consensus, government agencies, and news media (Broniatowski et al., 2018). Within the current digital, social, and political landscape, demonstrable facts have become clouded in an epistemological murk; it is increasingly difficult for individuals to decide what is reasonable to believe and do. As such, implementing CT as a social norm, cultural value, and educational outcome is an urgent and timely issue.

CT consists of skills and dispositions (American Philosophical Association, 1990; Bailey et al., 2019; Clifford et al., 2004; Dwyer et al., 2013; Halpern, 1999). Higher-order thinking tasks

such as analysis, interpretation, inference, evaluation, and explanation exemplify CT skills. CT dispositions are a network of attitudes, intellectual values, and mental habits, which influence the way individuals approach a thinking task. More specifically, CT dispositions motivate the appropriate application of CT skills (Ku & Ho, 2009; Walsh, 1996). In other words, CT dispositions represent the willingness to think critically (Facione et al., 2013).

The truth-seeking factor of CT disposition is described as a tendency to eagerly seek knowledge, courageously ask questions, and honestly pursue evidence. Truth-seeking is further characterized as a sensitivity and receptivity to new information, and a willingness to update one's preconceptions (Facione et al., 1995). Unfortunately, a pattern in the data has emerged from diverse samples in multiple countries (Ireland, Norway, Japan, China, Singapore, and the US); students tend to be disinclined to truth-seeking, more so than any other factor of CT disposition (Bers et al., 1996; Facione et al., 1995; Lampert, 2006; McBride et al., 2002; Noone & Seery, 2018; Vivien et al., 2010; Yeh & Chen, 2003). These findings suggest CT educators must grapple with a pressing question – how does a tendency for seeking truth manifest in students, and how can such a tendency be cultivated or nurtured? In order to answer that question, it is first necessary to understand what factors are associated with and/or predictive of a concern for truth.

Literature Review

The Delphi Report

In 1988, the American Philosophical Association organized The Delphi Group; an interdisciplinary panel of experts tasked with formulating an operational and comprehensive definition of CT. Over the course of two years, the panel converged on a robust description of

CT as an educational outcome and published The Delphi Report. Therein, they described the ideal critical thinker as being

> habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgements, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit (American Philosophical Association, 1990).

California Critical Thinking Disposition Inventory. Using the description of the ideal critical thinker above, Facione and Facione (1992) created the California Critical Thinking Disposition Inventory (CCTDI), an instrument designed to measure CT disposition in a systematic way. This was done by generating multiple phrases for each consensus description given in The Delphi Report (creating a pool of 250 items). These phrases were subsequently screened for ambiguities (narrowing the pool to 150 items). After a pilot study was conducted to test reliability and validity, 75 items were retained for the final version of the instrument. Factor analytic methods grouped the items into seven sub-scales (i.e. factors) of CT disposition which were labeled *truth-seeking*, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness, and maturity (Facione et al., 1994).

Critical Thinking Disposition and Personality. The big five factors – agreeableness, conscientiousness, extraversion, openness, and neuroticism – are the dominant model of trait structure in the personality literature (Donellan et al., 2006; John et al., 2008; Mcrae & Costa,

2008). The factors of CT disposition and the big five factors of personality both purport to measure dispositional traits, many of which are conceptually analogous in their qualities. For instance, high openness is described in terms of intellectual curiosity and flexibility. High conscientiousness is characterized by a need for order, systematicity, and diligence. Low agreeableness and low neuroticism connote skepticism and equanimity, respectively. Such characteristics also reflect intellectual principles that are plausibly related to a concern for truth and CT dispositions more broadly, but little empirical research has tested the potential relations between these constructs.

Previous research has shown both openness and conscientiousness are positively related to CT (Halpern, 2007; West et al., 2008), but the literature is comprised of mixed results. One study found openness was positively related to performance on the Watson-Glaser Critical Thinking Appraisal and accounted for 5.5% of the variance in CT skills, whereas conscientiousness, agreeableness, and extraversion were unrelated to CT skills (Clifford et al., 2004). To the best of our knowledge, this is the only study to test the relation between CT, extraversion, and agreeableness.

Importantly, these findings fail to illuminate how the big five factors relate to CT *disposition*. Ku and Ho (2009) found openness was positively related to a concern for truth, whereas conscientiousness bore no relation to a concern for truth, in a sample of 137 Chinese undergraduates. But it is unknown if this finding can be generalized to a Western population. Given the lack of an established theory, consistent results, and cross-cultural validity regarding the relation between personality and CT disposition (in this case, a concern for truth), the current study is exploratory in its design.

Purpose

The present study was interested in exploring the relationship between a concern for truth, personality, and demographics, and was guided by two research questions; what personality and demographic variables are associated with a concern for truth, and which of those variables are predictive of a concern for truth? As such, this study aimed to empirically test the relation between a concern for truth and the big five factors of personality in college students. This study also sought to examine the relation between a concern for truth, age, class rank, and academic performance (GPA) in students.

Method

Participants

Participants were 367 (89 men, 275 women, 5 who did not indicate a gender) undergraduate and graduate students at a university in the Rocky Mountain region. Participants ranged in age from 18 to 30+ (36% freshman, 25% sophomore, 19% junior, 15% senior, .5% graduate education or higher, and 4.5% who did not indicate a class rank). Participants were representative across majors: art (3%), business (5%), STEM (49%) (science, technology, engineering, and mathematics), the humanities (8%), and social sciences (35%).

Measures

Concern for truth. A concern for truth was measured using the Concern for Truth scale (Ku & Ho, 2009) which was derived from the maturity and truth-seeking subscales of the CCTDI (Facione, 1992). The scale measures fair-mindedness and a truth-seeking attitude, such as a proclivity to think independently based on objective evidence and good reasoning. It consists of 12 items (e.g. *I will hold firm to my belief even if there is evidence against it* and *No matter what the truth is, I will go along with the majority view*), all of which are reverse-coded and use a 5-point Likert scale ranging from *strongly disagree* to *strongly agree*. Reliabilities estimates based

on the current sample were found to be adequate for basic research ($\alpha = .65$) (Taber, 2016), particularly with respect to a scale of this length and dimensionality (i.e. 12 items and two dimensions) (Cortina, 1993).

Big five factors. The big five factors of personality were measured using the Mini-IPIP (Donellan et al., 2006), a short-form of the International Personality Item Pool – Big-Five Factor Markers (Goldberg, 1999). The inventory consisted of 20 items and five subscales – conscientiousness, agreeableness, extraversion, neuroticism, and openness. Each subscale was comprised of 4 items, 2 were reverse-coded. (e.g. extraversion subscale; *I am the life of the party*). The inventory used a 5-point Likert scale ranging from *very inaccurate* to *very accurate*. Reliabilities estimates based on the current sample for all of the subscales were found to exceed acceptable levels for basic research, and ranged from fairly high to robust (Cortina, 1993; Nunnally, 1978; Taber, 2016). Specifically, ($\alpha = .81$) for openness, ($\alpha = .78$) for agreeableness, ($\alpha = .77$) for conscientiousness, ($\alpha = .77$) for extraversion, and ($\alpha = .85$) for neuroticism. Furthermore, previous studies suggest sufficient discriminant, convergent, and criterion validity for the Mini-IPIP (Donellan et al., 2006).

Demographic variables. Demographic variables included age (1 = 18 to 20 years old, 5 = 30+ years old); gender (1 = male, 2 = female, 3 = other); race (1 = Native American, 2 = Asian, 3 = African American, 4 = White, 5 = Pacific Islander, 6 = other / unknown); class rank (1 = freshmen, 5 = graduate student); and GPA/field of study (1 = art, 5 = social sciences).

Procedure

This project was approved by the Institutional Review Board of the first author's University. The participants were volunteers and received some course credit for their participation. Participants were recruited through email using student organization and class

mailing lists, social media platforms, and word of mouth. Recruitment materials stated that the researchers were interested in learning about student's attitudes. The participants completed an electronic survey which was created and administered via Qualtrics Survey Software. The survey was comprised of questions regarding participants' concern for truth, personality, and demographic information.

Results

Preliminary analyses

All statistical analyses were conducted using IBM SPSS software (version 24). Diagnostic statistics assessed for multicollinearity; all variables were deemed sufficiently independent. Three assumptions of regression were assessed to mitigate skewness of results (Field, 2013). Variables in the study adhered to the assumptions of normality, linearity, and homoscedasticity. Mahalanobis distance, Cook's distance, and residual plots were analyzed to detect bias and potential outliers. Four data points were revealed to be extreme and influential. These data points were recoded and thereby excluded from the analysis.

Descriptive statistics and correlations

A bivariate correlation analysis was conducted on all non-categorical variables (i.e. concern for truth, openness, extraversion, agreeableness, conscientiousness, neuroticism, age, class rank, and GPA) to identify the factors associated with a concern for truth. Concern for truth had a moderate positive relation to openness ($r = .35$, $p < .001$), a weak positive relation to agreeableness ($r = .13$, $p = .01$), and a weak negative relation to neuroticism ($r = -.13$, $p = .01$). In other words, as a concern for truth increased, openness increased moderately, agreeableness increased slightly, and neuroticism decreased slightly. Concern for truth was also positively related to age, class rank, and GPA. Both conscientiousness and extraversion were unrelated to a concern for truth. The

mean, standard deviation, and score ranges are listed in Table 1. Correlations of the measures and all non-categorical demographic variables are listed in Table 2.

Stepwise multiple regression analysis

A multiple linear regression analysis was conducted to evaluate which variables are predictive of a concern for truth. Given the exploratory nature of the study, the stepwise selection method – particularly, bidirectional elimination (a combination of forward selection and backward deletion) – was employed (Field, 2013, p. 349). All non-categorical demographic variables were included as predictors (age, class rank, and GPA). Informed by the correlation analysis, only those personality traits that were significantly related to a concern for truth (openness, agreeableness, and neuroticism) were included as predictors, resulting in 6 predictors total.

The stepwise method yielded five iterative steps (i.e. models), wherein the predictor with the most significant correlation to a concern for truth was entered first. After parsing out the effect of the predictor already entered, the most significant of the remaining predictors was entered second, and so on. At each iteration, tests on all predictors previously entered determined those variables were still significant, in order to arrive at a model of best fit (Model 5). Model 5 was significant overall, $R^2 = .24$, $F\ (2,081) = 20.40$, $p < .001$

Openness was the most significant predictor of a concern for truth ($\beta = .32$, $p < .001$), followed by age ($\beta = .19$, $p = .001$), GPA ($\beta = .15$, $p = .002$), neuroticism ($\beta = -.13$, $p = .006$), and class rank ($\beta = .13$, $p = .01$). Agreeableness was found to be a non-significant predictor and was excluded from all models. The model summaries are listed in Table 3, and the coefficients of each predictor across all models are listed in Table 4.

Discussion

Assessments of CT dispositions have reported low scores in truth-seeking amongst college students, a pattern that is well-replicated and consistent across cultures. These findings have disconcerting implications for CT education and beg the question of how to cultivate an intrinsic interest and concern for truth in students. The current study contributes to answering this question by exploring the relations between a concern for truth, personality, and demographics.

Consistent with previous research, openness was positively related to a concern for truth. Openness was also the most significant predictor of a concern for truth amongst the variables studied, accounting for 13% of the variance between students. These finding suggests that as openness increases by one standard deviation (2.54), a concomitant increase of 0.32 standard deviations (1.64) in a concern for truth can be expected if all other variables are held constant.

A novel finding of this study is that neuroticism was inversely related to and significantly predictive of a concern for truth. It is possible that emotional stability lends itself to dispassionate analysis, and in turn, a concern for truth by proxy. A concern for truth entails courageously asking difficult questions and acknowledging inconvenient truths which may elicit greater levels of anxiety in more neurotic individuals, thereby disincentivizing a concern for truth. The positive associations between a concern for truth, age, class rank, and academic performance (GPA) are also novel findings. As a matter of emphasis, GPA was associated with a concern for truth approximately to the same extent as conscientiousness.

The current study supports previous findings that indicate a concern for truth is lacking in college students. Approximately 30% of participants indicated they either *agree* or *strongly agree* with the statement *I will hold firmly to my belief even if there is evidence against it*. Including those who indicated they neither *agree* nor *disagree* with the previous statement; this

subset represents 51% of the sample. As such, there appears to be a need for pedagogies, social norms, and cultural values that foster a respect for evidence and cognitive flexibility in students.

Implications

Given that CT dispositions represent attitudes and values, interventions that target affective traits are a necessary aspect of CT education. Personality and dispositions have traditionally been conceptualized as being relatively stable and resistant to intervention in the long-term, however, recent research suggests this assumption is unwarranted. A recent meta-analysis concluded that there is definitive evidence personality traits are fruitful targets for applied intervention, rather than being mere predictors of outcomes (Bleidorn et al., 2019).

Previous research has shown long-term trait changes in openness and neuroticism due to a variety of interventions, such as psychedelic assisted therapy (Bouso et al., 2018), cognitive behavioral therapy (Vittengl, 2003), and cognitive training (Jackson et al., 2012). These findings are particularly relevant in light of the present study. For instance, CT education may benefit from incorporating techniques from acceptance and commitment therapy (a variant of cognitive behavioral therapy designed to foster cognitive flexibility), but there is no research to date that has investigated the effects of acceptance and commitment therapy in a non-clinical setting (Sloshower, 2020).

Although the underlying mechanisms of personality trait change are still poorly understood, current theory suggests recurrent and consistent changes in personality states – the moment to moment thoughts, feelings, and behaviors that comprise the more enduring patterns of personality traits – are a driver of personality trait change. This process appears to be mediated by changes to self-concept, and conversely, modification of self-concept reinforces changes to personality states, wherein new habits modify self-concept, and subsequently, a

modified self-concept mediates changes to personality states (Bleidorn et al., 2019). As such, pedagogies designed to increase a concern for truth in students may benefit by intervening at the level of accumulated personality states. Similarly, pedagogies, social norms, and cultural values that can successfully integrate a concern for truth into student's identities are likely to see robust and enduring effects.

The positive associations between a concern for truth, age, and class rank suggests a concern for truth may exhibit developmental effects. Age was more so associated with a concern for truth than class rank, however, class rank was still a significant predictor of a concern for truth after parsing out the effects of age. It is possible that both developmental processes and greater educational attainment lead to an increased concern for truth, and that these effects are somewhat independent of each other.

Limitations and future research

This research is limited in its use of a (non-random) convenience sample. Self-report is susceptible to demand characteristics and biased responses. Future work assessing a concern for truth and personality via a combination of peer-report and self-report may help overcome this limitation. To the best of our knowledge, this is the first time the concern for truth scale has been used in a Western sample. The scale was originally derived from and normed to a sample of Chinese college students (Ku & Ho, 2009). The scale yielded a reliability coefficient of .65; although this coefficient is acceptable given the scale's length (Cortina, 1993), it is relatively low, and therefore, future research in this vein would benefit from a measure of truth-seeking disposition that yields an improved reliability. Also, each of the big five factors are comprised of six conceptually distinct sub-factors. Future research would do well to utilize a long form measure of the big five factors that allows for a more fine-grained analysis of sub-factors. The

current sample was predominantly comprised of white women in their late teens, so the results reported here may not generalize to a broader population; future work in this domain should include a more diverse sample. However, the generalizability and cross-cultural validity of the findings here are strengthened by congruent results from a Chinese sample (Ku & Ho, 2009).

The current study's correlational design does not allow for inferences regarding causality. Future studies that utilize an experimental design and conduct statistical analyses that can detect potential mediator and moderator effects could provide further insight into the relations between a concern for truth, personality, and demographics. The literature would also benefit from studies that assess the effects of interventions targeting a concern for truth. More importantly, the literature shows that truth-seeking is a CT demand in short supply, therefore, research that yields evidence-based interventions for truth-seeking would have practical applications in CT education and society more broadly.

References

Bailey, K. G. D., Rembold, L., & Abreu, C. M. (2019). Critical thinking dispositions and skills in the undergraduate research methods classroom. *Scholarship of Teaching and Learning in Psychology*. https://doi.org/10.1037/stl0000158

Bers, T. H., Mcgowan, M., & Rubin, A. (1996). The disposition to think critically among community college students: The California critical thinking disposition inventory. *The Journal of General Education, 45,* 196-233.

Bleidorn, W., Hill, P. L., Back, M. D., Denissen, J. J. A., Hennecke, M., Hopwood, C. J., Jokela, M., Kandler, C., Lucas, R. E., Luhmann, M., Orth, U., Wagner, J., Wrzus, C., Zimmermann, J., & Roberts, B. (2019). The policy relevance of personality traits. *American Psychologist, 74*(9), 1056–1067.

Bouso, J. C., dos Santos, R. G., Alcázar-Córcoles, M. Á., & Hallak, J. E. C. (2018). Serotonergic psychedelics and personality: A systematic review of contemporary research. *Neuroscience and Biobehavioral Reviews*, *87*, 118–132. https://doi.org/10.1016/j.neubiorev.2018.02.004.

Broniatowski, D. A., Jamison, A. M., Qi, S., AlKulaib, L., Chen, T., Benton, A., Quinn, S. C., & Dredze, M. (2018). Weaponized Health Communication: Twitter Bots and Russian Trolls Amplify the Vaccine Debate. *American Journal of Public Health*, *108*(10), 1378–1384.

Butler, H. A., Pentoney, C., & Bong, M. P. (2017). Predicting real-world outcomes: Critical thinking ability is a better predictor of life decisions than intelligence. *Thinking Skills and Creativity*, *25*, 38–46. https://doi.org/10.1016/j.tsc.2017.06.005.

Clifford, J. S., Boufal, M. M., & Kurtz, J. E. (2004). Personality traits and critical thinking skills in college students: empirical tests of a two-factor theory. *Assessment, 11*(2), 169-176.

Cortina, J. M. (1993). What is coefficient alpha? an examination of theory and applications. *Journal of Applied Psychology*, *78*(1), 98–104. https://doi.org/10.1037/0021-9010.78.1.98

Donellan, B. M., Oswald, F. L., Baird, B. M., & Lucas, R. E. The mini-IPIP scales: Tiny yet effective measures of the big five factors of personality. *Psychological Assessment*, *18*(2), 192-203.

Dwyer, C. P., Hogan, M. J., & Stewart, I. (2014). An integrated critical thinking framework for the 21st century. Thinking Skills and Creativity, 12, 43–52. http://dx.doi.org/10.1016/j.tsc.2013.12.004.

Ennis, R. H. (1987). A taxonomy of critical thinking dispositions and abilities. In J. B. Baron, R. J. Sternberg (Eds.), *Teaching thinking skills: Theory and practice* (pp. 9-26). New York, NY: W H Freeman/Times Books/ Henry Holt & Co.

Facione, P. A. (1990). Critical thinking: a statement of expert consensus for purposes of educational assessment and instruction. *American Philosophical Association*, 1-112.

Facione, P. A. (1992). The CCTDI: a disposition inventory. Millbrae, CA: California Academic Press.

Facione, P. A. (1994). Are college students disposed to think? Millbrae, CA: California Academic Press.

Facione, P. A., Sanchez, C. A., Facione, N.C., & Gainen, J. (1995). The Disposition toward Critical Thinking. *44*(1), 1-25.

Facione N.C., Facione P.A., Giancarlo C.A.F. (2013). California Critical Thinking Disposition Inventory: CCTDI. Millbrae, CA: Insight Assessment/California Academic Press; 2013:8.

Field, A. P. (2013). *Discovering statistics using IBM SPSS statistics: and sex and drugs and rock "n" roll*. Sage.

Grossmann, I., Na, J., Varnum, M. E., Kitayama, S., & Nisbett, R. E. (2013). A route to well-being: intelligence versus wise reasoning. *Journal of experimental psychology. General*, *142*(3), 944–953. doi:10.1037/a0029560.

Halpern, D. F. (2007). Halpern Critical Thinking Assessment Using Everyday Situations: Background and Scoring Standards, Claremont, CA: Claremont McKenna College.

Halpern, D. F. (1999). Teaching for critical thinking: Helping college students develop the skills and dispositions of a critical thinker. New Directions for Teaching and Learning, 1999, 69–74. http://dx .doi.org/10.1002/tl.8005.

Jackson, J. J., Hill, P. L., Payne, B. R., Roberts, B. W., & Stine-Morrow, E. A. (2012). Can an old dog learn (and want to experience) new tricks? Cognitive training increases openness to experience in older adults. Psychology and aging, 27, 286.

John, O. P., Naumann, L. P., & Soto, C. J. (2008). Paradigm shift to the integrative big five trait taxonomy: History, measurement, and conceptual issues. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), Handbook of personality: Theory and research (3rd ed., pp. 114–158). New York, NY: Guilford Press.

Ku, K. Y., & Ho, I. T. (2010). Dispositional factors predicting Chinese students' critical thinking performance. *Personality and Individual Differences*, *48*54-58. doi:10.1016/j.paid.2009.08.015.

McCrae, R. R., & Costa, P. T. (2008). The five-factor theory of personality. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), Handbook of personality: Theory and research (3rd ed., pp. 159–181). New York, NY: Guilford Press.

McBride, R., Xiang, P., & Wittenburg, D. (2002). Dispositions toward critical thinking: The preservice teacher's perspective. *Teachers and Teaching: Theory and Practice*, 8, 29-40.

Nancy, L. (2006). Critical Thinking Dispositions as an Outcome of Art Education. *Studies in Art Education*, (3), 215.

Noone, T., & Seery, A. (2018). Critical thinking dispositions in undergraduate nursing students: A case study approach. *Nurse Education Today*, *68*203-207. doi:10.1016/j.nedt.2018.06.014.

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.

Sloshower, J., Guss, J., Krause, R., Wallace, R. M., Williams, M. T., Reed, S., & Skinta, M. D. (2020). Psilocybin-assisted therapy of major depressive disorder using Acceptance and Commitment Therapy as a therapeutic frame. *Journal of Contextual Behavioral Science*, *15*, 12–19. https://doi.org/10.1016/j.jcbs.2019.11.002.

Taber, K.S. (2018). The use of cronbach's alpha when developing and reporting research instruments in science education. *Research Science Education, 48,* 1273-1296. doi: 10.1007/s11165-016-9602-2

US Congress. (1994). Goals 2000: National Goals for Education Act. US Government Printing Office; Washington, DC.

Vivien, W. X., Tham, L. K., Lau, S. L., Mei, T. Y., & Kiat, T. K. (2010). An exploration of the critical thinking dispositions of students and their relationship with the preference for simulation as a learning style. *Singapore Nursing Journal*, *37*(2), 25-33.

Vittengl, J. R., Clark, L. A., & Jarrett, R. B. (2003). Interpersonal problems, personality pathology, and social adjustment after cognitive therapy for depression. Psychological Assessment, 15, 29 – 40. http://dx.doi .org/10.1037/1040-3590.15.1.29.

Walsh, C. (1996). Critical thinking disposition of university students in practice disciplines (nursing, education, and business) and non-practice disciplines (english, history, and psychology): an exploratory study. *UMI*, 189.

West, R. F., Toplak, M. E., & Stanovich, K. E. (2008). Heuristics and Biases as Measures of Critical Thinking: Associations with Cognitive Ability and Thinking Dispositions. *Journal of Educational Psychology, 100*(4), 930–941.

Yeh, M., & Chen, H. (2003). Comparison affective dispositions toward critical thinking across Chinese and American Baccalaureate nursing students. *Journal of Nursing Research (Taiwan Nurses Association), 11*(1), 39-46.

Tables

Table # 1
Descriptive Statistics for All Variables

	Range	M	SD
Concern for Truth	28 - 58	42.83	5.14
Openness	10 - 20	15.53	2.54
Extraversion	9 - 20	13.75	2.56
Agreeableness	8 - 20	16.81	2.38
Conscientiousness	10 - 20	15.35	2.34
Neuroticism	9 - 20	13.49	2.27
Age	1 - 5	1.83	1.31
Class Rank	1 – 5	2.18	1.11
GPA	.08 - 4.00	3.34	.59
Race	1 - 6	4.12	.85

Gender	1 - 2	1.76	.43
Field of Study	1 - 5	3.68	1.08

Note: *N*= 363

Table # 2
Pearson Correlations Between a Concern for Truth and Non-Categorical Variables

Correlations of non-categorical variables									
	1	2	3	4	5	6	7	8	9
1. Concern for Truth	1								
2. Openness	.35**	1							
3. Conscientiousness	.00	.04	1						
4. Extraversion	-.04	.17**	.03	1					
5. Agreeableness	.13*	.22*	.20*	.20*	1				
6. Neuroticism	-.13*	.04	-.05	-.02	.05	1			
7. Age	.29**	.11*	-0.00	-.12*	.06	.06	1		
8. Class Rank	.24**	.12	-.07	.00	.07	.04	.44**	1	
9. GPA	.15*	.04	.17**	-.13	.06	.04	-.06	-.07	1

Note: Possible range of Concern for Truth scores = 12-60. Possible range for Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism = 5-20.
*p < .05, **p < .01. *N* = 363

Table # 3
Multiple Regression Model Summaries

					Change Statistics				
Model	*R*	*R* Square	Adjusted *R* Square	Std. Error	*R* Square Change	*F* Change	df1	df2	Sig. F Change
1	.355[a]	.126	.123	4.81354	.126	47.199	1	328	.000
2	.433[b]	.188	.183	4.64691	.062	24.945	1	327	.000
3	.458[c]	.209	.209	4.59181	.022	8.894	1	326	.003

4	.475[d]	.226	.226	4.55159	.016	6.787	1	325	.010
5	.489[e]	.239	.239	4.51749	.014	5.925	1	324	.015

Note. Dependent variable: Concern for Truth; *N* = 363.

a. Openness
b. Openness, Age
c. Openness, Age, GPA
d. Openness, Age, GPA, Neuroticism
e. Openness, Age, GPA, Neuroticism, Class Rank

Table # 4

Multiple Regression Coefficients (openness, age, GPA, neuroticism, and class rank)

		Unstandardized		Standardized		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	31.690	1.643		19.290	.000
	Openness	.717	.104	.355	6.870	.000
2	(Constant)	30.763	1.597		19.265	.000
	Openness	.661	.101	.327	6.522	.000
	Age	.981	.196	.250	4.994	.000
3	(Constant)	26.664	2.092		12.743	.000
	Openness	.646	.100	.320	6.4443	.000
	Age	1.007	.194	.257	5.182	.000
	GPA	1.282	.430	.147	2.982	.003
4	(Constant)	30.550	2.555		11.958	.000
	Openness	.660	.100	.326	6.626	.000
	Age	.972	.193	.248	5.031	.000
	GPA	1.244	.427	.143	2.916	.004
	Neuroticism	-.289	.111	-.128	-2.605	.010
5	(Constant)	29.924	2.549		11.742	.000
	Openness	.641	.099	.317	6.465	.000
	Age	.745	.213	.190	3.495	.001
	GPA	1.313	.424	.151	3.094	.002
	Neuroticism	-.306	.110	-.135	-2.774	.006
	Class Rank	.612	.252	.133	2.434	.015

Note. Dependent variable: Concern for Truth; Predictors: Openness, Age, Race, GPA, Neuroticism, Class Rank; *N* = 363.