

# Examining Predictors of Social Work Students' Critical Thinking Skills

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**Abstract:** *This study examined BSW, MSW and PhD social work students' (N=72) critical thinking skills using the California Critical Thinking Skills Test (CCTST). Social work students who tested as more open to experience on a personality inventory, took chemistry in college, and reported having both parents with a college degree had higher critical thinking skills. There was a trend toward higher levels of critical thinking as academic levels increased. Implications and recommendations are discussed for social work classrooms, field practica, and admissions.*

**Keywords:** *Critical thinking, personality factors, social work education*

## INTRODUCTION

National education reports since the 1980's have emphasized the role of higher education in developing students' critical thinking skills (Tsui, 1999). However, research shows mixed results on whether a college education improves these skills (see, for example, McMillan, 1987; Williams & Worth, 2001). The Educational Policy and Accreditation Standards (EPAS) of the Council of Social Work Education (CSWE) (2008) reflect this national interest in the importance of critical thinking by identifying critical thinking as one of the 10 core competencies social work students must master during their professional education. Educational Policy 2.1.3 identifies how critical thinking should be applied to "inform and communicate professional judgments" based on social workers' knowledge of "logic, scientific inquiry, and reasoned discernment . . . augmented by creativity and curiosity" (CSWE, p. 4). This policy statement identifies critical thinking as crucial to social workers' ability to:

- distinguish, appraise, and integrate multiple sources of knowledge, including research-based knowledge, and practice wisdom;
- analyze models of assessment, prevention, intervention, and evaluation; and
- demonstrate effective oral and written communication in working with individuals, families, groups, organizations, communities, and colleagues. (CSWE, 2008, p. 4).

The ability to think critically has direct relevance for competent social work practice. Social work students need to learn how to assess client problems using a complex biopsychosocial model and how to implement interventions at multiple levels. They are being trained to collaborate within interdisciplinary settings with professionals whose

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perspective on client problems and preferred interventions may differ from theirs. Social work students must develop skills to make nuanced judgments about complicated ethical dilemmas that have no clear or obvious solutions. The importance of helping students develop critical thinking skills assumes particular importance as the social work profession moves toward an emphasis on evidence-based practice (EBP) defined as “the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of clients” (Gibbs & Gambrill, 2002, p. 452). As Shlonsky and Stern (2007) explain, “EBP is a way of putting critical thinking into systematic action” (p. 604). Thinking critically, therefore, is a core competency in the development of professional judgment, a hallmark of our profession.

The EPAS also specify that social work programs identify how they assess each of the core competencies in order to “evaluate the extent to which the competencies have been met” (CSWE, 2008, p. 16). Whether or not students are learning critical thinking skills needed for competent professional practice, therefore, is an important focus for social work educators. Despite recognition of its importance to the development of professional competence, research on social work students’ critical thinking skills has been sparse. Little is known about students’ skill levels, including whether these skills improve over the course of social work education or whether courses designed to increase students’ critical thinking skills are successful. Even less is known about whether student characteristics are associated with critical thinking ability. The purpose of this study is to add to the knowledge about whether demographic and/or personality variables are related to critical thinking skills and to determine the levels of critical thinking skills attained by social work students at the baccalaureate, masters, and doctoral levels.

Various definitions of critical thinking stress different aspects of this concept. Halpern (1997) identifies “thinking that is purposeful, reasoned, and goal-directed” and consists of “strategies that increase the probability of a desirable outcome” (p. 4). Dobrzkowski (1994) concludes that critical thinking “requires one to be able to discriminate relevant from irrelevant, to consider multiple facts and data from a variety of sources, to analyze these facts and data into working hypotheses, and to derive plausible consequences from these hypotheses” (p. 273). Gambrill (1990) stresses the ability to identify and refute fallacies in logic, consider contrary evidence, understand statistical principles, and apply research findings to understanding client problems. Under the leadership of the American Philosophical Association, a group of 46 experts engaged in a systematic study of the elements of critical thinking resulting in *The Delphi Report* (Facione, 1990) which defines critical thinking as “purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, inference, as well as the explanation of evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based” (p. 3). This definition was used as the basis for developing a discipline-neutral test of critical thinking skills called the California Critical Thinking Skills Test (CCTST) (Facione, Facione, Blohm & Giancarlo, 2002).

A controversy within the critical thinking literature exists over the extent to which the generic critical thinking skills described above are sufficient for, or good predictors of, making well-reasoned judgments in a particular domain (Smith, 2002; Williams, Oliver & Stockdale, 2004). Gibbs et al. (1995) developed a domain-specific measure of critical

thinking for social work students called PRIDE 1 (Principles of Reasoning, Inference, Decision-Making and Evaluation). This instrument attempts to measure whether students transfer knowledge about research principles to practice decisions by analyzing the extent to which student responses to a video employ logical reasoning and identify common fallacies in arriving at a sound clinical decision. However, the PRIDE 1 has not been widely used and has failed to find a relationship between critical thinking about practice and research knowledge (Gibbs et al.) or detect a change in BSW students' critical thinking following a course designed to teach critical thinking skills (Kersting & Mumm, 2001).

This study uses the CCTST (Facione et al., 2002) to measure students' levels of critical thinking. One advantage of using the CCTST over other generic scales is that it is based on the American Philosophical Association's definition of critical thinking (Facione, 1990) which was developed by a multidisciplinary group of experts through a process of consensus (Facione et al.). This same definition of critical thinking was used as the framework for the US Department of Education in setting its educational goals in 2000 (Facione et al.). Therefore, the definition of critical thinking underlying the CCTST has wide acceptance as conceptually valid. A second reason for choosing the CCTST for this study is its history in measuring the critical thinking skills of nursing students who, like social workers, are being educated to develop sound clinical judgment. Aggregate data analysis of 145 samples from 50 nursing programs that used the CCTST to test their students' critical thinking skills showed modest gains in critical thinking (Facione & Facione, 1997). More recent studies of nursing students using the CCTST found significant increases in students' scores over time (McCarthy, Schuster, Zehr & McDougal, 1999; Spelic, et al., 2001; Thompson & Rebesch, 1999) and across educational levels (Shin, Jung, Shin & Kim, 2006), while others had mixed results (Beckie, Lowry, & Barnett, 2001) or found no change (Choi, 2004; Saucier, Stevens & Williams, 2000).

Nursing research on critical thinking has been driven by the National League for Nursing requirement that nursing schools provide quantifiable evidence of their students' critical thinking skills (Rapps, Riegel & Glaser, 2001). This requirement has resulted in a substantial body of literature that focuses on ways to measure nursing students' critical thinking and to test the effectiveness of educational strategies in improving these skills (For overviews, see Staib, 2003 and Tanner, 2005). The controversy mentioned above concerning the use of generic measures (such as the CCTST) versus developing discipline-specific measures of critical thinking is evident in the nursing literature. Although a Delphi study of expert nurses agreed on a discipline-specific definition of critical thinking for nursing (Scheffer & Rubenfeld, 2000), this definition has not been used to guide further research (Tanner). The experience of nurses, who have conducted research on critical thinking for over a decade, highlights for the social work profession the complexity involved in describing critical thinking, choosing and/or developing appropriate measures, and testing which educational methods are effective in enhancing students' skills.

## LITERATURE REVIEW

Six studies have tested the critical thinking skills of BSW and/or MSW students, while there have been no studies involving social work PhD students. Using the CCTST, Clark (2002) found no statistical differences between the scores of BSW and MSW students; however, scores of both groups were comparable to norms established for college students by the developers of the measure. Klau (1996), using the Watson-Glaser Critical Thinking Appraisal, found that BSW students scored lower than upper division students in four-year colleges, but that BSW students who took chemistry and geometry scored significantly higher than students who did not. While Harrison and Atherton (1990) did not measure critical thinking per se, their study of the related concepts of reflective judgment and cognitive maturity is informative. They used the Scale of Intellectual Development (SID-IV) to measure reflective judgment and The Attitudes About Reality (AAR) scale to distinguish between a positivist or social constructivist view of reality. The SID-IV consists of four subscales (dualism, relativism, commitment, and empathy) and is derived from Perry's (1970/1999) scheme of how individuals' problem-solving processes become more complex and ethical over time. Using these instruments, the authors found that MSW students were significantly more likely than BSW students to view reality in complex, rather than dualistic ways, indicating the greater cognitive maturity of MSW students.

Three studies examined whether specific training in critical thinking improved social work students' skills. Huff (2000) found that MSW students' scores on the CCTST significantly increased after a policy course, whether their educational experience was in the classroom or by interactive television. Statistically significant increases were found for overall scores and for the subscales of Evaluation and Inference. Plath, English, Connors, and Beveridge (1999) found that BSW students' scores on the Ennis-Weir Essay Test showed statistically significant improvement following an instructional unit on critical thinking, while their scores on the Cornell Critical Thinking Test (CCTT) did not. Kersting and Mumm (2001) taught a one-semester BSW course that emphasized identifying and evaluating evidence and recognizing faulty reasoning. The authors found no statistical difference in students' pre- and posttest scores using a social work-specific instrument (PRIDE 1) that measured how students made decisions about interventions. A related study tested the critical thinking skills of social work field instructors. Rogers and McDonald (1992) found that supervisors who were taught critical thinking skills in a 10-session seminar had higher posttest scores on the Watson-Glaser Critical Thinking Appraisal than a control group.

There is some preliminary evidence that students with low critical thinking skills encounter particular difficulty in improving these skills. Kowalski and Taylor's (2004) finding that psychology students with higher critical thinking scores were more willing than those with lower scores to change their misconceptions about psychological information suggests that students with lower levels of critical thinking may require additional assistance in overcoming a natural bias toward belief preservation. Williams et al. (2004) concluded that students with low critical thinking skills "appear to find critical thinking activities somewhat disconcerting, often characterizing critical thinking demands as tricky and even unfair" (p. 50). Williams, Oliver, Allin, Winn, and Booher

(2003) observe that students with lower critical thinking skills are more focused on identifying correct answers than understanding the reasoning involved in arriving at those answers.

Certain personality characteristics have been found in previous studies to be related to critical thinking skills and have been included in this study. Studies of undergraduates (Clifford, Boufal & Kurtz, 2004) and nursing students (Profetto-McGrath, 2003) have found a relationship between the personality characteristic of open mindedness and higher critical thinking scores. Ennis (as cited in Clifford et al., 2004) was one of the first to advocate that cognitive ability and personality dimensions contribute jointly to critical thinking skills. As Facione et al. (2002) conceptualize this relationship, simply possessing good critical thinking skills does not guarantee that individuals will choose to routinely use these skills. Certain mental disciplines or habits, such as open mindedness, cognitive maturity, truth-seeking, and being systematic, are elements of our personality or character that “impel us toward using CT [critical thinking], rather than something less rational, as our problem-solving strategy” (Facione et al., p. 4). Previous research has also shown that certain demographic variables such as race/ethnicity (Flowers & Pascarella, 2003), socioeconomic status (Cheung, Rudowicz, Lang, Yui & Kwan, 2001; Klau, 1996), and undergraduate courses in science and/or math (Klau, 1996; Tsui, 1999) are associated with critical thinking.

Building on prior research, this study examines whether certain personality characteristics or demographic variables are associated with higher levels of critical thinking. The study also explores critical thinking skills across academic level by including social work students at the baccalaureate, masters, and doctoral levels. Such information can begin to inform social work educators about students’ critical thinking skills and guide them in developing curricula and teaching strategies that further the ongoing development of these skills across the educational continuum.

## METHODS

### Participants

Participants for this study included 73 social work students from three social work programs located in Mid-Atlantic region of the United States. Sixty of the participants (82.2%) were enrolled in a large publicly funded social work program as masters (n = 49) and doctoral students (n = 11). The remaining 13 participants were enrolled as bachelors of social work students at a small private college (n = 12) and a large public university (n = 1). One participant was excluded from the study due to incomplete data on the critical thinking test, resulting in a final sample size of 72. Most respondents were female (93.1%) and Caucasian (80.6%), ranging in age from 21 to 60 ( $M = 32.39$ ,  $SD = 10.51$ ). A majority of masters and doctoral students (69.5%) had an undergraduate degree in psychology (n = 24), sociology (n = 4) or social work (n = 14). When compared to national data on social work students (Lennon, 2000), this sample had a higher percentage of Caucasian and female students.

**TABLE 1. Sample Demographics**

	BSW (N=13)	MSW (N=48)	PhD (N= 11)	Total (N=72)
Race/Ethnicity				
Caucasian Non-Hispanic	11	40	7	58
Minority	2	7	3	12
Missing		1	1	2
Gender				
Female	13	44	10	67
Male	0	4	0	4
Missing			1	1
Age				
21-29	10	29	2	41
30-49	3	13	8	24
50+	0	6	1	7
Parents' College Degree				
Both parents	8	33	9	50
One or no parents	5	14	2	21
Missing		1		1

### Procedures

A cross sectional design which examines a single group at one point of time was used for this survey research project. Study participants were recruited in April and May of 2007 by receiving a flyer in their student mailboxes and classrooms explaining the purpose of the study and inviting all students to participate. To facilitate greater student participation, surveys were administered several times at each participating University. At each survey administration session, students received a letter of invitation which explained the purpose of the study and the anonymous and voluntary nature of the study. The authors provided directions for completing the survey instruments and monitored the sessions. Consistent with the time periods suggested by the authors of the personality inventory and the critical thinking test, students were given 75 minutes to complete the full survey which also included demographic information. No incentives were offered to the students who volunteered. Study procedures were reviewed by the Institutional Review Boards of all three universities, which granted exemptions due to the anonymity of the survey.

### Measures

*California Critical Thinking Skills Test 2000 (CCTST)*. The CCTST is a 34-item multiple choice test based on the American Philosophical Association's definition of critical thinking as "the process of purposeful, self-regulatory judgment" (Facione et al., 2002, p. 2). The test provides a total critical thinking score and five subscales. The subscales of analysis, evaluation, and inference represent the core critical thinking skills and when combined provide a total critical thinking score. "The two other sub-tests on

the CCTST follow a more traditional conceptualization of reasoning which divides the realm into inductive and deductive reasoning” (Facione et al., 2002, p. 6).

The analysis subscale includes the skills of categorization, clarifying meaning, examining ideas, and assessing arguments (Facione et al., 2002). Evaluation refers to the ability to assess the credibility and logical strength of relationships as well as the ability to justify reasoning (Facione et al.). The inference subscale includes the skills of “querying evidence, conjecturing alternatives, and drawing conclusions” (Facione et al., 2002, p. 7). The CCTST has demonstrated good reliability and validity (alphas ranging from .70 to .84) (Facione et al.). For this study, the most recent version of the test was used (CCTST 2000) which is considered to be a richer and more robust instrument for evaluating critical thinking (Facione et al.).

*NEO-Five Factor Inventory (NEO-FFI)*. The NEO-FFI is a 60-item test with good reliability (alphas ranging from .74 to .89) that measures five personality domains: neuroticism, extroversion, openness, agreeableness, and conscientiousness (Costa & McCrae, 1992). Each domain represents a continuum of the personality dimension and although the scales are described as a comparison of the extremes, most individuals will score in the middle of the scale (Costa & McCrae). The neuroticism scale contrasts emotional stability at the lower end of the scale with emotional distress at the high end of the scale (Costa & McCrae). Extraversion is defined as a preference for being around people as well as being more energetic; while introversion is defined as being independent, reserved, and even tempered (Costa & McCrae). The openness domain, short for openness to experience, measures a person’s preference for variety and curiosity (open) versus a preference for conventional behavior and a narrow scope of interests (closed) (Costa & McCrae). Agreeableness contrasts the tendency to help and cooperate with others with the opposing tendency toward competitiveness and skepticism of others’ intentions. Lastly, the conscientious individual is determined, focused, and strong-willed (Costa & McCrae). The NEO-FFI uses a five-point Likert scale ranging from *strongly disagree* (0) to *strongly agree* (4). In this sample of social work students, all personality domains had good reliability scores with alphas ranging from .72 to .89.

*Demographics*. Students were asked their race, age, gender, and academic degree. Because the sample size was smaller than expected, and had limited diversity, race was recoded into two categories: Caucasian and minority. Based on prior research exploring SES status (Cheung et al., 2001) and the influence of undergraduate science courses (Klau, 1996), students were asked if their mother and father had a college degree and if they had completed undergraduate courses in geometry and chemistry. Completion of a course was coded as 1 and non-completion was coded as 2. Data on parent’s degree was recoded into one dichotomized variable representing students with two college degree parents (coded as 1) compared to students with one or no college degree parents (coded as 0).

### **Data Analysis**

Using SPSS 13, predictors of critical thinking were analyzed by running a regression analysis. Research and theory did not provide a clear rationale for the order of entry into

the regression model; therefore all variables were entered simultaneously. Nine predictor variables were entered into the regression model: race, parents' degree, the five personality domains from the NEO-FFI, geometry, and chemistry. Assumptions for regression analysis (Cohen, Cohen, West & Aiken, 2003) were tested and adequately met.

## RESULTS

### Predictors of Critical Thinking

The overall regression model was significant ( $F = 3.423, p = .002$ ), accounting for 35.5% of the total variance in critical thinking (adjusted  $R^2 = .251$ ). The lower adjusted  $R^2$  is due to the limited sample size in relation to the number of predictors in the model. Students who reported that both of their parents had a college degree had significantly higher critical thinking scores ( $t = 3.238, B = 3.460, p = .002$ ). Students with higher scores on the openness scale of the NEO-FFI had higher critical thinking scores ( $t = 2.594, B = .243, p = .012$ ) and those who reported taking an undergraduate chemistry course also had higher scores ( $t = -2.182, B = -3.740, p = .033$ ). Race was also significant ( $t = -2.014, B = -2.834, p = .049$ ) with Caucasians having higher critical thinking scores than minorities. However, this finding should be interpreted with caution due to the  $p$  value being close to .05. Geometry was not significant and openness was the only personality domain significantly related to critical thinking (See Table 2 for regression statistics). Thus, social work students who took chemistry in college, reported having both parents with a college education, and are more open to experiences had higher critical thinking skills.

**TABLE 2.** Summary of Regression Analysis for Variables Predicting Critical Thinking (N = 66)

Variable	<i>B</i>	<i>SE B</i>	$\beta$	<i>t</i>	<i>p</i>
Race (Caucasian = 1, Minority = 2)	-2.834	1.407	-.233	-2.014	.049
Parents - college degree (both yes = 1, no = 0)	3.460	1.069	.381	3.238	.002
Neuroticism	.021	.068	.040	.313	.756
Extraversion	-.019	.095	-.025	-.201	.841
Openness to experience	.243	.094	.305	2.594	.012
Agreeableness	.138	.105	.158	1.311	.195
Conscientiousness	.059	.088	.083	.676	.502
Geometry (yes = 1; no = 2)	1.180	1.993	.069	.592	.556
Chemistry (yes = 1; no = 2)	-3.740	1.714	-.255	-2.182	.033

( $F = 3.423, p = .002$ )

### Critical Thinking Skills by Social Work Degree

Due to a limited number of respondents in the BSW and PhD categories, the study had insufficient power for a statistical comparison by social work degree. However, it is interesting to note that critical thinking scores were in the expected direction (higher scores for higher degrees) and the mean scores for each degree category were higher than the averages given by the test developers (Facione et al., 2002; Insight Assessment, 2006).

**TABLE 3. Critical Thinking Scores by Social Work Degree (N = 72) Compared to Norm Samples (Facione et al., 2002; Insight Assessment, 2006)**

	N	Mean	SD
Social work students:			
BSW	13	17.92	4.33
MSW	48	19.83	4.64
PhD	11	22.00	4.69
Total	72	19.82	4.679
Norm samples:			
4-year college	2677	16.80	5.062
Masters nursing	153	19.01	5.087

## DISCUSSION

The purpose of this study was to explore social workers' critical thinking skills across academic levels and examine the predictors of these skills. The regression model found several significant relationships between demographic and personality variables and critical thinking skills. The correlation between critical thinking and socioeconomic status in this study is consistent with previous research. Higher socioeconomic status has been found in previous studies to be correlated with higher levels of students' critical thinking (Cheung et al., 2001; Klau, 1996). Previous studies, however, measured SES by parents' occupation (Cheung et al.) or used Hollingshead's criteria (Klau). This study's finding that students who had two parents with college degrees had higher levels of critical thinking than students with only one or neither parent with a college degree adds information on the significance of a different indicator of SES (i.e., level of parental education), to students' critical thinking skills.

Due to an inadequate number of BSW and PhD respondents, it was not possible to conduct a statistical analysis of critical thinking scores by social work degree. However, critical thinking scores did show a clear trend toward greater ability to think critically as social work students' academic levels increase. This trend is of particular interest as the study is the first to include doctoral social work students. Future longitudinal studies that include social work students at all academic levels could help to assess changes in students' critical thinking skills over time.

### **Limitations and Strengths**

The generalizability of this study's findings is limited by its use of a small, mostly female, volunteer sample, predominantly from one school of social work. The predictor to respondent ratio (9 to 66 in this study) for the regression analysis exceeds the 1 to 15 recommendation by Stevens (2002) which may decrease the generalizability of the regression results. In addition, the small sample size compromised the power to detect statistically significant relationships where they may have existed. Using a cross-sectional rather than a longitudinal design, limits the ability to examine the effects of social work education on students' critical thinking skills. Finally, students self selected to participate in this voluntary study, therefore results may be influenced by selection bias.

This study has several strengths. It is unique in that it represents the first effort to include students across the entire continuum of social work education and to examine the connections between personality factors and critical thinking for social work students. Another asset was the use of reliable and valid instruments to measure critical thinking skills and personality factors.

### **Implications for Social Work Education**

One of the study's most important findings, a correlation between critical thinking skill and openness to new experience, has several implications for social work educators. Suggestions are offered on ways to foster the development of students' critical thinking skills in the classroom and field by focusing on increasing their open-mindedness and ability to imagine alternative ways to assess and solve problems. Implications for admissions and field instructor training are also offered.

While previous studies of nursing students (Profetto-McGrath, 2003) and undergraduates (Clifford et al., 2004) found a correlation between critical thinking and the personality characteristic of open-mindedness, this was the first study of social work students to find this connection, lending additional support to a correlation between these two variables. This finding suggests that helping social work students develop the habit or discipline of open-mindedness may have a positive effect on their critical thinking skills. Some of the attitudes and behaviors associated with the openness domain in the NEO-PPI include "active imagination, aesthetic sensitivity, attentiveness to inner feelings, preference for variety, intellectual curiosity, and independence of judgment" (Costa & McCrae, 1992, p. 15). Individuals who score high on this scale tend to have an interest in both their inner lives and the outer world, are open to new ideas, and experience emotions intensely (Costa & McCrae). By designing assignments to target the enhancement of these qualities, establishing a safe atmosphere where discovery is valued, and modeling an attitude of open inquiry, classroom teachers can help to increase students' openness to new ideas and experiences with the ultimate goal of improving their ability to think critically.

By providing an environment that encourages discovery, including being open to new learning that emerges through student inquiry and discussion (Pithers & Soden, 2002), social work educators can model an attitude of openness to new experiences. Gray (1993)

suggests that after teachers present their ideas as clearly as possible, they honestly invite students to collaborate in examining these ideas and to generate alternative views by asking such questions as, "I can't think of any other explanation, can you?" (p. 70). Such questions are most effective when posed in the spirit of genuine inquiry, not as a way to "test" students or as a device to help them arrive at a pre-determined "correct" answer. Irving and Williams (1995) caution that instructors may feel anxious when "dealing openly with challenging and conflicting views" as this process entails "being prepared to expose our own (and others') vulnerabilities" (p. 112). However, when the classroom instructor is willing to take such risks, the classroom environment can feel like a place for students to acknowledge their own limitations, increase their willingness to examine their own views and consider alternatives.

Van Gelder (2005) identifies cognitive bias, a natural tendency of individuals to selectively use evidence to support and preserve their own beliefs, as a hurdle to developing openness to new information. By explicitly raising students' awareness of this tendency, along with providing opportunities to actively practice looking for contradictory evidence, students can be helped to be open to changing their minds when evidence contradicts their original belief (van Gelder). Gibbs and Gambrill (1999) offer games and exercises that highlight cognitive bias which can be effective tools in helping students recognize how such biases affect perception and decision-making. Social work educators can design assignments to highlight cognitive bias while encouraging students' intellectual curiosity, imagination, and openness to new ideas and information. For example, prior to studying adolescence as a life stage in an HBSE class, instructors could ask questions about this developmental stage such as: "Is it generally a time of turmoil? What happens to teenagers' relationships with their parents and siblings during this time? What marks the "end" of adolescence?" Students could then be assigned to find evidence that supports and evidence that contradicts their opinion and bring this information to a subsequent class discussion. As part of this discussion, the instructor could invite students to consider how much their own experience of adolescence affected their initial opinions and to what extent research evidence supports and/or challenges their beliefs.

Specific strategies for helping students become more openminded are often based on using group discussion and analysis, for example, listening to, considering, and evaluating alternative views and experiences in arriving at a solution. Material in films (Shdaimah, 2009; Weerts, 2005) and case vignettes can be used to identify problems and generate alternative solutions. For example, Mottola and Murphy (as cited in Staib, 2003) trained nursing students to be open to alternative views through having them engage in group discussion and analysis of solutions to a practice dilemma. Students were directed to identify all the factors they included in formulating their solution and then "think about factors they had not previously considered before the group discussion" (Staib, p. 502). The final step, which explicitly required students to identify and be open to previously unconsidered solutions, was seen as crucial by the researchers.

As mentioned earlier, there is preliminary evidence that students with low critical thinking skills present particular problems due to their unwillingness to change their misconceptions (Kowalski & Taylor, 2004), their experience of critical thinking as "tricky" (Williams et al., 2004), and their preference for concrete answers (Williams et

al., 2003). Such research seems consistent with the connection found in this study between open-mindedness and critical thinking. For these students, instructors can help by focusing on the decision-making process, rather than the correct answer, when reviewing exam material or in-class exercises. Williams et al. (2004) suggest a peer coaching program in which students with high levels of critical thinking review exams with students with lower critical thinking levels and explain how they arrived at their answers, a process that could benefit both groups of students. Instructors can also address students' lack of critical thinking skills by providing written feedback on assignments, e.g., thoughtful questions which are intended to provoke students' curiosity about their work. The student could be given a period of time to consider the questions posed by the instructor and then meet to discuss their thoughts. This process allows the instructor to identify strengths and weaknesses in the student's critical thinking skills and to use the specifics of the student's written work to engage and challenge the student.

Devising strategies to assist students who are less interested, motivated, or able to engage in a critical thinking process is a fruitful area for additional research. Helping these students first develop open-mindedness as a "habit of mind" could lay the groundwork for developing critical thinking skills such as seeking and evaluating evidence to support their beliefs or decisions.

Field instructors have many opportunities to provide new experiences for their students through selecting case assignments in the agency and community. In order for these experiences to provide fertile ground for development of critical thinking skills however, field instructors need to purposefully engage students in reflecting upon and evaluating their experiences. By modeling openness to students' ideas, sharing with students *how* they make decisions and evaluate their own work, and asking questions that require reflection and analysis, field instructors can help students use their new experiences to sharpen their critical thinking (Deal, 2003). Schools of social work might consider offering training in critical thinking to field instructors. By improving their own critical thinking skills, field instructors could be better prepared to assist their students develop these skills (Rogers & McDonald, 1992).

The correlation between critical thinking and openness to new experiences also provides implications for admission of students into social work programs. As part of admissions scoring, schools of social work could design an essay question to evaluate students' openness and curiosity or consider looking for signs of these attributes in student essays or interviews. One school found that applicants who succeeded in gaining admission to a social work postgraduate program following an interview scored higher on the openness scale of the NEO-PI-R, suggesting that students perceived by interviewers as "more open, less judgmental and more accepting" were seen as a good fit with the profession (Manktelow & Lewis, 2005, p. 305).

## CONCLUSION

Given the mixed results found in this and previous studies (Clark, 2002; Harrison & Atherton, 1990; Huff, 2000; Kersting & Mumm, 2001; Klau, 1996; Plath et al., 1999), future research is needed to assess the impact of social work education on social work

students' critical thinking skills, particularly whether social work education in general, and/or courses specifically designed to teach such skills, are successful in increasing students' critical thinking abilities. The correlation found between students' ability to think critically and the personality trait of open-mindedness, however, suggests one promising area of future knowledge development. By developing and testing strategies to increase students' openness and curiosity in both classroom and field, social work educators may discover ways to prepare students to engage in the rigorous process of critical thinking.

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