The Relation of Social and Emotional Learning to Empathy and Critical Thinking Development in Middle School Students

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The Relation of Social and Emotional Learning to Empathy and

Critical Thinking Development

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Abstract

The study involved an intervention with 18 seventh-grade students (ages 12-13) intended to increase critical thinking and empathy skills. Researchers met with students three mornings each week (for a total of about two hours each week) for seven weeks to conduct interactive psychology-based activities. Students completed pretest and posttests on empathy and critical thinking. Results indicated there was not an increase in empathy. The only critical-thinking scale that demonstrated a significant change was scholarly rigor. There were no significant correlations between the change in empathy and the change in critical thinking on any of the five subscales. Despite the small sample size and lack of control group, this study points to a possible connection between a school intervention in psychology-based activities in social and emotional learning (SEL) and a couple of aspects of critical thinking indicating value in exploring this further.

Chapter 1
Introduction

The implementation of the Common Core standards ("Common Core State Standards," 2010) and the No Child Left Behind Act of 2001 ("The Elementary and Secondary Education Act," 2010) has placed schools under increased pressure to demonstrate high levels of academic achievement. Students' scores on standardized tests are used to measure academic achievement and growth. Due to the increased pressure on school systems and teachers to produce students who achieve high scores and growth on standardized tests, it is important to demonstrate that social and emotional learning (SEL) skills can be valuable to students, as well as increase students' abilities to perform well on these standardized tests. If this value could be demonstrated, schools could be encouraged to invest the money and resources necessary to incorporate SEL skills into their curriculum.

In the United States, new standards called "Common Core States Standards" have been adopted into school systems; currently, forty-two out of the fifty states, plus the District of Columbia have integrated these standards into their state requirements. The Common Core States Initiative (CCSI) provides states with specific requirements regarding what students in kindergarten through twelfth grade should know. The Common Core Standards are designed for integration into each state's existing standards ("Development Process," n.d.).

In Georgia since 2002, these standards have been the Georgia Performance Standards (GPS), the Common Core Georgia Performance Standards (CCGPS), and the Georgia Standards of Excellence (GSE). In the areas of Mathematics and English Language Arts, Georgia transitioned from the CCGPS to the GSE in the 2015-2016 school year. In the areas of Science and Social Studies Georgia will be transitioning from the GPS to the GSE in the 2017-2018 school year. Currently, the primary focus of the standards is in the traditional subjects or

cognitive factors. Topics such as English, science, mathematics, health education, languages, and material that relate to academic learning of these subjects are considered cognitive factors (Baldi, Warner-Griffin, & Tadler, 2015). In contrast, non-cognitive factors refer to concepts such as social skills, empathy, self-discipline, and the like. Non-cognitive factors including empathy are not required by the standards and are often not taught in school. Critical thinking could be considered a cognitive factor, was referenced in the GPS and even more in the GSE. The teacher assessment tool Teacher Keys Effectiveness System (TKEYS) also values critical thinking in the rubrics used to access teachers ("TAPS_Reference_Sheet," n.d.). Teaching critical thinking appears to be increasingly valued in education.

With society rapidly moving towards an even greater technological and globalized economy, employers are seeking to hire individuals who can think quickly and critically to analyze and integrate information from diverse sources (Halpern, 2003; Wagner, 2008). Fortunately, because critical thinking is not domain-specific, once an individual is taught and can master the skill, he or she can then apply it to every area of his or her life (Halpern, 2003). Teaching adolescents how to think critically will benefit them throughout their lives, as these skills will not only prove valuable in academia but will be a necessity to function at a competent and competitive level in the 21st-century global economy (Wagner, 2008). However, the ability to think critically is not one that is innate but rather must be learned. Research indicates that critical thinking skills can be taught, and specifically, there exists a best practice to do so. The research is clear that explicit, rather than implicit, critical thinking (CT) instruction is necessary for development and mastery of CT skills (Abrami et al., 2015; Abrami et al., 2008; Howard, Tang, & Austin, 2015; Klein, Olson, & Stanovich, 1997; Rimiene, 2002; Reed, 1998).

While the standardized tests are designed to assess the cognitive factors that are taught in

school subjects, non-cognitive factors make a significant contribution to grade point average (GPA) ("Consortium UChicago," 2012). Work habits, prosocial behaviors, and other non-cognitive factors play a major role in GPA ("SA-Rec-Reading," 2014). The fact that non-cognitive factors play a prominent role in GPA matters because research indicates that school GPA is a better predictor of academic success than test scores in both middle school (Kurlaender, Reardon, & Jackson, 2014) and high school (Geiser & Santelices, 2007). According to Geiser and Santelices (2007), as well as Kurlaender et al. (2014), GPA is one of the strongest predictors of future academic success. Considering these findings, it makes sense to examine the non-cognitive factors that impact GPA and look at how social and emotional learning can teach non-cognitive factors.

Also, research supports the idea that non-cognitive factors taught in social and emotional learning (SEL) programs may be significantly important in predicting future success. Wentzel (1993) discovered that social behavior was a stronger predictor of grades than test scores among sixth and seventh-grade students, reinforcing the idea that it is important to consider teaching non-cognitive factors in education. The relationship between non-cognitive factors and success is evidenced by a study conducted by Malecki and Elliott (2002). This study found that social skills positively associated with academic achievement and problem behaviors negatively correlated with academic achievement among third and fourth-grade students; this is another reason why SEL factors that have an influence on GPA should be considered.

The findings of studies conducted by Malecki and Elliott (2002) and Wentzel (1993) indicate that social and emotional learning programs can contribute to increased prosocial behavior which could help to raise GPA and decrease bullying. A potential reduction in bullying is significant considering that the National Center for Education Statistics reports that in 2013,

22 percent of students age 12-18 reported being bullied at school during the school year ("The NCES Fast Facts Tool," n.d.). Non-cognitive factors are a significant component to increasing prosocial behaviors within education. Higher levels of certain aspects of empathy, such as empathic concern and perspective taking, have been found to be significant predictors of prosocial behaviors (Flournoy et al., 2016; Litvack-Miller, McDougall, & Romney, 1997). Perspective taking is considered an aspect of cognitive empathy and is the ability to see something from another person's perspective. A study by Batanova and Loukas (2012) found that higher levels of school connectedness had a significant effect on perspective taking. School connectedness, for boys, predicted higher levels of empathic perspective taking when measured a year later, while school connectedness had a buffering effect on the ability of parental conflict to negatively impact perspective taking in girls (Batanova & Loukas, 2012). There may be value in designed social and emotional learning to increase the level of school connectedness; as discussed in the previous study conducted by Batanova and Loukas (2012), SEL may contribute to prosocial behavior which in turn could help to increase GPA and decrease bullying.

Empathy is one of the non-cognitive factors that can be addressed by social and emotional learning. However, there has been disagreement about the definition of empathy as the majority of studies suggest there is both an emotional and cognitive component. The emotional component of empathy is often subdivided into emotional simulation and emotional regulation. Emotional simulation is considered part of affective or emotional empathy and simulates the elements of another's physical experience including brain activation. One of the main indicators of brain activation related to emotional empathy is the activity of neurons known as mirror neurons. Gallese, Fadiga, Fogassi, and Rizzolatti (1996) originally discovered mirror neurons while studying macaque monkeys, and Fadiga, Fogassi, Pavesi, and Rizzolatti (1995)

found mirror neurons to be present in the brains of humans as well. Studies on mirror neurons suggest that empathy includes a body-based empathic attunement with shared neural circuits.

An individual's ability to emotionally regulate feelings towards another person by taking a third person perspective is considered another aspect of emotional empathy. According to Jackson, Brunet, Meltzoff, and Decety (2006), research findings reveal there exist substantial differences in the neural systems involved in first person perspective taking, where an individual imagines how he or she would feel in a given scenario, and third person perspective taking, which involves an individual imagining how another person would feel.

Cognitive empathy or perspective taking involves understanding how another person views the world and understanding something from another's perspective. Perspective taking is considered to be an aspect of empathy. Research has supported the idea that cognitive empathy is distinct and different from emotional empathy in that it activates various regions of the brain (Shamay-Tsoory, Aharon-Peretz, & Perry, 2009). Shamay-Tsoory et al. (2009) tested the hypothesis that cognitive empathic abilities exist and are different from those related to emotional empathy (mirror neuron system) and that different anatomical parts of the brain are utilized for cognitive empathy than for emotional empathy. Shamay-Tsoory et al. (2009) found that individuals with damage to the inferior frontal gyrus (IFG) had deficits in emotional empathy, and individuals with ventromedial (VM) damage had deficits in cognitive empathy. This research reported a significant anatomical difference between the areas of the brain involved in the two types of empathy and suggested that cognitive empathy is distinct from emotional empathy. Consistent with the previous research, a meta-analysis conducted by (Fan, Duncan, de Greck, & Northoff, 2011) suggested that affective empathy is associated with increased insula activity and activity in the midcingulate cortex and cognitive empathy results in

activity in the dorsomedial prefrontal cortex (MCC/dmPFC). Additionally, Eres, Decety, Louis, and Molenberghs (2015) combined an MRI study with an empathy questionnaire and concluded that gray matter density was able to predict empathy scores. Specifically, higher affective empathy was predicted by a greater density of gray matter in the insula cortex, and higher cognitive empathy was predicted by a greater density of gray matter in the MCC/dmPFC. Combined research makes a strong case for empathy consisting of at least two components.

There has been some debate over whether empathy is a stable concept or a learned concept. Neurobiological evidence ties empathy to brain abnormalities or neurodevelopmental disorders. Research includes a study in which students with autism spectrum disorder (ASD) showed a lower level of empathic response when compared to normally developing individuals after witnessing a researcher pretend injury (Butean, Costescu, & Dobrean, 2014). Spinella (2005) observed an inverse relationship between prefrontal system dysfunction and empathy. Both studies suggest that empathy has a biological basis in the brain, which lends itself to the concept of stability.

In contrast, Georgi, Petermann, and Schipper (2014) and Yu and Chen (2012), while researching neuronal plasticity, observed that empathy could be learned and that empathic abilities can change. Georgi et al. (2014) discovered that students receiving training for careers in medicine scored higher than controls in cognitive empathy, and a group of social, professional students scored the highest (and greater than the medical students) in affective empathy. Georgi et al. (2014) concluded that their training contributed to the higher empathy scores by teaching empathy. Georgi et al. (2014) could have included a pretest as part of the design, which would have established temporal precedence and strengthened the internal validity of the study.

Consistent with the idea that empathy can be taught, Yu and Chen (2012) conducted a study with nursing students which concluded that a one-hour simulation of aging led to greater improvement in their attitudes towards aging than the control group. If attitudes, understanding, and empathy towards others can change through learning experiences, then maybe empathy and social and emotional competence can be taught.

Some interventions support the value of social and emotional learning. Though empathy is not often studied alone, social and emotional learning (SEL), which includes empathy, has more research to support it. A meta-analysis of 213 studies indicated that participation in an SEL program was associated with an 11% increase in academic achievement (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011). Consistent with the results found by Durlak et al. (2011), another study was conducted that took place over 12 weeks, with participants (n=99) tested before and after the program. The students who participated in an SEL program that included mindfulness showed greater empathy, emotional control, perspective taking, and improved cognitive control (Nathanson, Rivers, Flynn, & Brackett, 2016). The findings generated by Durlak et al. (2011) and Nathanson et al. (2016) support the idea that SEL programs can have value in the classroom through increasing academic achievement and by improving empathy, emotional and cognitive control.

Şahin (2012) and Castillo, Salguero, Fernández-Berrocal, & Balluerka (2013) used interventions that targeted empathy which produced positive results. The effects of empathy training in reducing bullying behavior was studied by Şahin (2012) in Turkey. Sixty-one students who showed bullying behavior were selected, and an additional 38 sixth grade students were included to participate in the intervention, with these students randomly chosen from a school in

Turkey. The participants were then divided randomly into two experimental and two control groups. It was found that the experimental group experienced a significant increase in empathy while also showing a decrease in aggressive behavior when compared with the control group. A similar study was conducted in Spain and examined the effect of a two-year intervention which used the ability model of emotional intelligence on empathy and aggression (Castillo et al., 2013). A total of 590 adolescents participated (54% female, 46% male) from eight high schools, and the participants ranged in age from 11-17 years (m=13.83). While males did not show an increase in the perspective taking component of empathy they experienced an increase in empathic concern. Female students, however, had high levels of empathy at the pretest, and a ceiling effect prevented any significant increases in scores from being observed (Castillo et al., 2013). Though Şahin (2012) and Castillo et al. (2013) both suggest that interventions that target empathy can produce significant results, only Şahin (2012) demonstrated significance across all the subjects. Castillo et al. (2013) found significance only for male students. It is important to note that both the Şahin (2012) and Castillo et al. (2013) studies were conducted in other countries, so the extent that these results generalize to U.S. is unknown.

Durlak et al. (2011), Yu and Chen (2012), Batanova and Loukas (2012), and Castillo et al. (2013) found that empathy levels can be increased through instruction, with the intervention having lasting effects. For example, nursing students who attended a one-hour lecture, and participated in a one-hour simulation of aging, displayed increased levels of empathy, while mindfulness training was found to increase levels of empathy and perspective taking for fourth and fifth-grade participants (Durlak et al., 2011; Yu & Chen, 2012). Similarly, instruction in emotional intelligence was found to increase levels of empathic concern for male participants, and higher levels of school connectedness predicted better empathic perspective-taking abilities

for participants one-year after the intervention (Batanova & Loukas, 2012; Castillo et al., 2013).

Critical thinking, empathy, and brain development all occur in a nonlinear manner; both constructs are dependent on the brain's maturation process (Hawk et al., 2013; Taylor, Barker, Heavey, & McHale, 2013a). One of the many neurological changes that take place during adolescence is synaptic pruning. Synaptic pruning is an experience-driven process as neural connections that are not strengthened by frequent use are destroyed by synaptic pruning. Additionally, when neural networks are stimulated, they strengthen and link the dendrites and synapses resulting in stronger learning pathways thereby significantly increasing the speed of neural transmissions (Blakemore & Choudhury, 2006). Specifically, regarding empathy development, this process happens in a nonlinear fashion resulting in highs and lows, during which an adolescent may experience a decline in his or her empathic ability (Hawk et al., 2013). Though the process takes most of the adolescent years, teens' brains progress from a self-oriented, egocentric mentality to developing the ability to consider the emotions and viewpoints of others (Hawk et al., 2013). The capacity for emotion recognition increases as the brain matures (Decety, 2010). Empathy and brain maturation impact change in the neural pathways that occurs in the limbic system by the frontal brain regions; this can result in a fluctuation in the range of emotions (Georgi et al., 2014). Regions of the brain involved with empathy development include the amygdala, the anterior cingulate cortex, the medial and orbitofrontal cortices, the insula, and the superior temporal sulcus (Decety, 2010).

The prefrontal cortex (PFC) is the area of the brain where critical thinking takes place (Taylor et al., 2013a; Watson & Breedlove, 2012). The PFC also allows for greater ability to empathize (Hawk et al., 2013; Taylor et al., 2013a). Those who can think critically may also be more capable of being empathic, as critical thinking skills are a major component of the

perspective-taking aspect of empathy. The PFC is the last portion of the brain to develop, taking approximately 25 years for full maturation. However, the PFC undergoes the most rapid amount of growth between the ages of 8 and16 years-old. Though other areas of the brain experience myelination earlier, the neurons in the PFC do not begin myelination until the individual reaches adolescence (Blakemore & Choudhury, 2006).

Critical thinking and empathy are both positively correlated with the development of the prefrontal cortex, so that, as the prefrontal cortex matures, the ability to think critically and to be empathic increases (Hawk et al., 2013). A person's ability to think critically and empathetically increases as the prefrontal cortex develops. Instruction of critical thinking and empathy would be more beneficial once the brain has begun shifting the executive brain functions away from the limbic system towards to the prefrontal cortex; this change occurs during adolescence (Georgi et al., 2014). Though the prefrontal cortex is not developed fully during adolescence, instruction meant to increase critical thinking and empathic ability would be beneficial, as instruction during this period of development would seemingly benefit from the plasticity of the brain (Hawk et al., 2013). Because brain plasticity causes neural connections to be strengthened with use, instruction of critical thinking and empathy during this time would likely shape the way the prefrontal cortex develops, so that the neural connections required for these functions would be strengthened (Klapwijk et al., 2013; Taylor et al., 2013a). Given the neuroplasticity of the adolescent brain, incorporating educational instruction around empathy development and critical thinking skills may biologically be one of the best times for students to further develop these skills and a useful addition to middle school curricula.

While the Common Core curriculum has provided greater uniformity in what is taught in

the classroom and what is expected, from both students and teachers, the curriculum could be improved by the inclusion of social and emotional learning. The inclusion of empathy into the Common Core curriculum and an increased emphasis on explicit critical thinking instruction are examples of such improvements. Increased focus on direct instruction of critical thinking would allow for students to have increased problem-solving abilities and to communicate more efficiently with others (White, 2010).

These new GSE standards are a positive sign for the increasing involvement of critical thinking into academics. There is no doubt that this could be strengthened with more of an emphasis on teaching critical thinking directly through explicit methods. Also, the inclusion of empathy instruction would allow for students to better understand the thoughts and feelings of others, which would lead to better communication and would likely be associated with a decrease in bullying behavior (Hawk et al., 2013; Şahin, 2012).

While research exists that supports the benefits of psychological activity-based interventions to increase empathy and critical thinking in school children, few studies have examined the effectiveness of interventions designed to address both factors, or that consider the relationship between the two factors. Additionally, little research exists that examines the effectiveness of these interventions when conducted with adolescents, or how these constructs might interact with each other during this developmental period.

The current study aimed to address the gap in the literature by evaluating the effectiveness of an intervention designed to increase empathy and critical thinking skills in middle school students. It was hypothesized that:

H1: Middle school students who participated in an intervention that consisted of a series of

psychology-based social and emotional learning (SEL) activities, that occurred over a seven-week period, would demonstrate an increase in empathy.

H2: Middle school students who participated in an intervention that consisted of a series of psychology-based SEL activities, that occurred over a seven-week period, would experience an increase in performance on the following critical thinking scales:

1. Mental Focus
2. Creative Problem Solving
3. Learning Orientation
4. Cognitive Integrity
5. Scholarly Rigor

H3: There would be a correlation between the change in the levels of empathy and the change in each of the five critical thinking scales after the middle school students participated in the SEL intervention program.

Chapter 2
Literature Review

There has been increasing pressure on schools in recent years to demonstrate the successful academic performance of their students. This pressure intensified with the No Child Left Behind Act of 2001 ("The Elementary and Secondary Education," 2010), which required greater accountability, state and district report cards, and standardized testing of students. These requirements led to an increased need for schools to prepare children for standardized tests and resulted in an increase in standardization of school curriculum in the United States. In recent years more well-defined standards for school curricula have begun to emerge. With the increased focus on academic testing, the importance of test scores to the schools, and the standardization of school curriculum, a case needs to be made for the importance of social and emotional learning. Without research to support the benefits of social and emotional learning, schools will have no reason to put resources, time, and energy towards this type of learning.

Starting in 2010 a new set of standards called "Common Core" began to be implemented in schools across America. Forty-two of the fifty U.S. states, as well as the District of Columbia, are currently members of the Common Core States Initiative (CCSI), which gives specific details about what students in kindergarten through 12th grade should be taught and tested. Common Core subjects taught from elementary school through high school include: reading, writing, speaking and listening, language, and math; beginning in 6th grade, history, science, social studies, and technical subjects are also taught ("Common Core State Standards," 2010). Each

state that elects to join the CCSI takes the Common Core Standards and combines these standards with the individual state standards to create the educational requirements for that state. Before the Common Core Standards were created, states struggled to implement standardized education.

Years ago, The Quality Basic Education Act of 1985 required that Georgia maintained a curriculum that specifically stated what was expected for students to know for each subject and grade. Additionally, the Quality Basic Education Act of 1985 required that the curriculum was reviewed every four years, with revisions made as necessary; however, this mandated review and revision did not take place until the 1996-97 school year, due to inadequate funding in the years prior. The Quality Core Curriculum (QCC) was adopted in 1985. The QCC was found by a Phi Delta Kappa audit in 2002 to lack depth, include more material than could be reasonably expected to be taught in one school year, as well as not meeting national standards ("Georgia Performance Standards," 2015). After this review, the Georgia Board of Education began developing and implementing the Georgia Performance Standards (GPS). The creators of the standards drew influence from national standards, from high-performing states, such as North Carolina and Michigan, as well as from nations that excel in the field of education, such as Japan ("Georgia Performance Standards," 2015). Additionally, guidelines from groups such as the American Association for the Advancement of Science and the National Council of Teachers of Mathematics were also used in the creation of the GPS ("Georgia Performance Standards," 2015). The GPS were superior to the previous versions as they went into more depth than did

the previous criteria, provided clearer expectations for what students should know, and provided teachers with more resources. The GPS identifies skills required to reason, problem-solve, communicate effectively, and make connections with other information ("Georgia Performance Standards," 2015). With the creation of the GPS, Georgia was now considered among the states with the top-rated curricula in the nation ("georgia.pdf.", n.d.). When the Common Core State Standards were released in 2010, the Georgia State Board of Education adopted the Common Core Standards as the Common Core Georgia Performance Standards (CCGPS) in the areas of English Language Arts and Mathematics. This was part of the "Race to the Top" effort by states to comply with the Common Core State Standard and receive grant money. Georgia received 400 million dollars over four years ("georgia.pdf.", n.d.). In both the Common Core (CC) and Georgia Performance Standards (GPS), critical thinking (CT) is briefly mentioned. Within the Common Core standards, there was a critical thinking component in areas such as literacy and science. An example is that of the English Language Arts Standards, which suggests that students be given reading comprehension questions that require them to "think critically" and use problem-solving skills ("English Language Arts Standards," 2016). The idea of thinking critically came through in the CCGPS as well. According to one of the seventh grade ELA CCGPS Frameworks units, there was an emphasis on promoting critical thinking through text analysis, argumentative writing, and examining evidence ("English Language Arts Standards," 2016).

Originally, the standardized tests used by the state of Georgia were the Criterion-

Referenced Competency Test (CRCT) for grades 1-8 and the Georgia High School Graduation Test (GHSGT). However, during the 2014-2015 school year, the Georgia Department of Education implemented a new standardized test, Georgia Milestones, to replace the CRCT (Beaudette, 2014; "Georgia Performance Standards," 2015). The exorbitant cost of the testing required to remain with the Common Core Standards was one reason that led Georgia to leave the Common Core Georgia Performance Standards and begin the shift to the Georgia Standards of Excellence (M. Hood, personal communication, June 9, 2017). In the areas of Mathematics and English Language Arts, Georgia transitioned from the CCGPS to the GSE in the 2015-2016 school year. In the areas of Science and Social Studies, Georgia remained with the GPS and will be transitioning from the GPS to the GSE in the 2017-2018 school year.

The Georgia Performance Standards have provided standards for English language arts, mathematics, science, and social studies, foreign language, agricultural education, health, physical education, and fine art. The Georgia Standards of Excellence now take the place of the CCGPS standards in the areas of ELA and mathematics and will soon take the place of the GPS in science and socials studies. The remaining GPS standards are still in place.

Though not directly mentioned in the 7th grade GPS standards, critical thinking appears to be incorporated to some extent into the inquiry-based approach that is used ("Kindergarten - SeventhGradeRevised," n.d.). Seventh-grade science standards outlined in the GPS include standard S7CSI where students are encouraged to use curiosity and skepticism in science and standard S7CS7 which requires students to question scientific claims and arguments. When the

transition happens to the GSE in science, it appears that there will be an even greater emphasis on critical thinking.

The Georgia Standards of Excellence in English Language Arts have been in place since 2015. They do not directly mention critical thinking, but they incorporate it in standards such as ELAGSE6RI1 which mentions citing textual evidence to support analysis, ELAGSE6RI8 which mentions evaluating argument claims examining the evidence, and ELAGSEGW1 which emphasizes writing arguments to support claims using evidence ("ELA-Georgia-Standards-of-Excellence-K-12," n.d.). In addition to evidence of critical thinking being incorporated in the standards, it is also included in the teacher evaluation process. One of the ways teachers are evaluated is by whether they integrate critical thinking into their teaching. The teacher assessment tool Teacher Keys Effectiveness System (TKEYS) is used in Georgia as a way of evaluating teachers. As part of the TKEYS, there are standards and rubrics used for teacher evaluation. In differentiated instruction one of the areas to score is whether the teacher develops "critical and creative thinking" through providing appropriate activities. Another area that emphasizes critical thinking is in instructional strategies. The teacher is evaluated on whether they are encouraging "higher order thinking" through asking questions and solving problems ("TAPS_Reference_Sheet," n.d.).

The focus of standards is in the traditional school subjects which employ cognitive factors. Cognitive factors refer to the substance of what is taught in traditional school subjects such as English, science, math, health education, music, and languages; they are required middle

school subjects (Baldi et al., 2015). Because CT is needed for success in these topics, it can be considered a cognitive factor.

The non-cognitive factors, on the other hand, are additional factors such as social skills, empathy, self-discipline, and more. The term non-cognitive factors simply relate to items that are not required in school. Of course, most of what is referenced in the Common Core and Georgia Performance Standards is about cognitive factors in both the CC and the GPS, and critical thinking was mentioned briefly in the GSE. It appears that with the transition into the Georgia Standards of Excellence critical thinking is becoming a more important part of the curriculum. For example, in social studies, the new standards are described as "marrying social studies and language arts" (Georgia Standards of Excellence, n.d) and utilizing the inquiry process described as "promoting critical thinking and higher-level processes" (GSE, n.d.). Nowhere else within the standards is it stated how CT should be implemented in the classroom. Though the standards mention CT, research suggests further CT interventions in the classroom would likely increase a student's ability to think critically (Reed, 1998).

For CT to be measured, a definition must first be reached. One of the most famous and comprehensive definitions of CT is the one written in The Delphi Report. The Delphi Report is the result of a collaboration between 46 experts in the field of CT who gathered in 1988 to reach a consensus regarding a definition of CT and the skills required to implement it (Dwyer, Hogan, & Stewart, 2014). The definition these individuals derived is as follows:

"…purposeful, self-regulatory judgment which results in interpretation, analysis,

> evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based" (Facione, 1990, p. 3).

Though this definition is almost 30 years old, it is still widely used today. This panel of experts concluded that the three core skills required to be able to engage in CT are: analysis, evaluation, and inference; without these skills, CT cannot take place (Dwyer et al., 2014). In fact, recent research by Dwyer, Hogan, and Stewart (2011) indicated that these three skills are significant and positively correlated: analysis and evaluation, analysis and inference, and assessment and inference.

Possessing the ability to think critically and solve problems is becoming increasingly important in today's society and has several benefits. As our society moves towards a more technological and globalized economy, being able to analyze and integrate enormous amounts of information from diverse sources will serve to benefit individuals in their careers. Because critical thinking is not domain-specific, once a person masters the ability, he or she is then able to apply it to every area of his or her life (Halpern, 2003). Critical thinking in the 21st Century will no longer just be a desirable skill but rather a necessity to function at a competent and competitive level (Wagner, 2008). To begin to think critically, he or she must be taught to do so.

Research by Klein et al. (1997), Rimiene (2002) and Reed (1998) supports that critical thinking skills can be taught. Klein et al. (1997), collected a sample of 55 fifth-graders consisting of 58% female (n=32) and 42% male (n=23), to test whether instruction could increase students' ability to read critically and write an argument. The students were randomly assigned to one of four different instructional groups: argument concepts, organizational

strategy, concepts and strategy, and a control group. In all groups, the students worked on reading, writing, and discussing arguments. Klein et al. (1997) found that the way the concepts and strategy were taught were not significant in improving the CT abilities of students; however, the strategy group, which was given explicit CT instruction, showed the greatest improvement in evaluating invalid-plausible arguments from pretest to posttest. Klein et al. (1997) observed that posttest scores on social items predicted significant variance in the science posttest scores, suggesting that there was a transfer of learning. The findings by Klein et al. (1997) indicate that not only can critical thinking skills be taught, but they are also not domain specific, and the skills can be transferred and applied across domains (Klein et al., 1997). Rimiene (2002), conducted a study to test a program intended to increase participants' abilities and motivation to think critically. This study consisted of 227 students ranging in age from 20 to 21-years-old. The participants were divided into two groups, with 77 participants in the experimental group and the remaining 150 participants in the control group. Both groups, at the time of pretest, showed no significant differences regarding critical thinking ability (Rimiene, 2002). Participants in the experimental group completed a three-month active-learning program, designed to teach and increase the motivation to use critical thinking skills. Rimiene (2002) found the posttest results to indicate that participants in the experimental group had significantly greater increases in critical thinking skills when compared to those in the control group. Reed (1998) found similar results to those of Rimiene (2002) in a study consisting of community college participants. Reed (1998) selected four U.S. history classes, with two of the classes serving as an experimental group and

the remaining two classes serving as a control. There was a total of 52 participants, 44% (n=23) were in the experimental group, and 56% (n=29) were in the control group. Out of the 52 participants, 65% (n=34) were female and 35% (n=18) were male. It was stated that 69% (n=36) of the participants were under the age of 22, while the remaining 31% (n=16) were over the age of 22. The experimental group received approximately an hour and a half of explicit CT instruction derived from Richard Paul's Model of Critical Thinking, and this model was integrated into class assignments (Reed, 1998). The control group, on the other hand, received traditional instruction on course materials. All participants were given pretest and posttest measures. The experimental group achieved a significantly greater increase in scores from pretest to posttest in comparison to the control group (Reed, 1998). The findings by Klein et al. (1997), Rimiene (2002), and Reed (1998) indicate that interventions can successfully teach critical thinking skills, which may lead to greater critical thinking ability. Though the Klein et al. (1997), Rimiene (2002), and Reed (1998) studies have become dated, the finding that critical thinking skills can be taught remains relevant. Though there are likely many ways to teach CT, research suggests a best practice of explicit instruction.

Abrami et al. (2015), Kettler (2014), and Howard et al. (2015) indicate that the best way to teach CT skills is to do so explicitly rather than implicitly. A meta-analysis conducted by Abrami et al. (2015), examined primary empirical studies using search terms related to critical thinking and teaching critical thinking. Out of the 3,720 studies considered, 117 studies met the inclusion criteria, which consisted of 20,698 total participants. Abrami et al. (2015) organized

the studies according to participants' ages and created the following categories: Elementary Education (6–10 years), Secondary Education (11–15 years), High school (16–18 years), Undergraduate post-secondary, Graduate post-secondary, and Adults. The meta-analysis demonstrated a relationship between the way that CT is taught and improved CT skills. The groups where CT was explicitly taught saw significant improvement versus the immersion implementation group where CT was not explicitly taught which resulted in small non-significant differences. Similarly, a study conducted by Kettler (2014) found that implicit instruction does little to foster critical thinking skills. This study consisted of 208 10-year-old students with an ethnic breakdown of 46% Asian, 40% White, 11% Hispanic, and 4% Black. Kettler (2014) compared the critical thinking abilities of students in general education classes (n = 163) with students in gifted classes (n=45) and found that gifted students had significantly more advanced critical thinking skills than the students in general education. Kettler (2014) also observed that gifted students' critical thinking skills were not significantly related to the amount of time the students spent in the gifted education program. It could then be said that the gifted students must be developing critical thinking skills independently. Additionally, it may be that students who already think critically are the ones who can test into the gifted programs. This idea is in line with previous research conducted by Abrami et al. (2008) that indirect or implicit instruction does little to foster critical thinking skills. The ineffectiveness of implicit instruction of critical thinking skills is further supported in a study by Howard et al. (2015). This study consisted of 659 participants, 390 males, and 247 females, who attended a university in

Tennessee. The classes that served as the experimental group (n =227 students) had a case study, regarding critical thinking, incorporated into the curriculum for a total of 4 hours over a semester. The control group (n =282 students) simply attended classes without the critical thinking case study intervention woven into their curriculum. Howard et al. (2015) observed that there was no improvement from pretest to posttest in CT related to the intervention. Issues of temporal precedence, small sample size, poor external validity, and ceiling effects were present in the studies mentioned above. However, despite the limitations of the studies by Abrami et al. (2015), Kettler (2014), and Howard et al. (2015), the results consistently indicate that CT increases when it is explicitly, rather than implicitly, taught.

There is growing research to support the idea that non-cognitive factors may be equally as important as cognitive factors in predicting future success. The cognitive factors include subjects that are taught in school and assessed on standardized tests. Though critical thinking is not by definition a cognitive factor, it plays a part in achieving success among the cognitive factors and is often included in performance standards. While standardized tests measure only cognitive factors, GPA also measures non-cognitive factors such as a student's work habits, self-discipline, self-efficacy, and prosocial behavior ("Consortium UChicago," 2012). These behaviors are essential in predicting a student's future success and cannot be measured on achievement tests. School GPA reflects more of these work habits and behaviors than test scores ("SA-Rec-Reading," 2014).

Research indicates that school GPA is a better predictor of academic success than test scores. Using a sample of 80,000 University of California students, Geiser and Santelices (2007) found that high school grade point average (HSGPA) is the best predictor of four-year college

outcomes (grades and graduation), and a better predictor than standardized tests. Several studies further suggest that GPA is a better predictor of future academic success than standardized test scores. Kurlaender et al. (2014) reported that middle school GPA is one of the strongest predictors of future academic success. Considering these findings, it makes sense to examine the non-cognitive factors, such as prosocial behaviors, that impact GPA.

Wentzel (1993) found that social behavior was a stronger predictor of grades than standardized achievement test scores. She conducted a study of 423 students in sixth and seventh grade examining GPA, standardized test scores, and peer and teacher reports of prosocial and antisocial behavior. The reports evaluated each student on how he or she shared, cooperated and helped others and on whether he or she was disruptive or broke the rules. Wentzel (1993) found a significant positive correlation between prosocial behavior and GPA, and she found that social behavior was a stronger predictor of grades than standardized test scores. Similarly, Malecki and Elliott (2002) conducted a study with 139 third and fourth-grade students to examine the relationship between social skills, such as cooperation, assertion, responsibility, empathy, and self-control, and standardized test scores. It was found that social skills positively correlated with academic achievement, and problem behaviors were negatively correlated with academic achievement (Malecki & Elliott, 2002). These findings point to the value of including non-cognitive factors in curriculum development or bringing in outside programs to address some of these other areas of learning. As demonstrated above, research supports the idea that GPA is a better predictor of future success than test scores, and that non-cognitive factors play a major role in GPA. When considered together, Geiser and Santelices (2007), Kurlaender et al. (2014), Wentzel (1993), and Malecki and Elliott (2002) suggest value in teaching non-cognitive factors in education. There is research that evaluates interventions designed to teach these non-

cognitive factors. These programs are often described as programs that teach social and emotional learning (SEL). According to the Collaboration for Academic, Social, and Emotional Learning (CASEL) ("What is SEL," n.d.) social and emotional learning involves learning attitudes, knowledge, and skills to manage emotions, be empathic, have healthy relationships, achieve goals, and make wise choices.

Empathy is a non-cognitive factor targeted in many SEL programs; though it is not a subject taught in school, current research indicates a positive relationship between empathy and school performance. In contrast to critical thinking, empathy is not a topic that the Common Core even attempts to include. As discussed, some of the Common Core standards, such as the English language, arts, and science, incorporate basic critical thinking skills; however, none of the curricula directly addresses empathy, an essential life skill, both in adolescence and across the lifespan.

Empathy should first be defined so that the value of targeting empathy in social and emotional learning interventions can be accurately considered. Empathy has been defined several different ways in the past, with many disagreements arising as to how empathy should be best conceptualized. Developments in brain research have expanded on previous ideas of empathy no longer considering it one concept. The debate about whether empathy is cognitive or affective in nature has evolved to include multiple aspects of empathy in the definition (Fields et al., 2011). A recent review of the concept of empathy evaluated the previous definitions of empathy to create a new conceptualization that would include the essential elements (Cuff,

Brown, Taylor, & Howat, 2016). Cuff et al. (2016) suggested that empathy includes cognitive and affective elements with the emotions of the observer and subject being similar but not identical. Cuff et al. (2016) also suggested that empathy can, but does not always, lead to a behavioral outcome, and that empathy is affected by trait (ability) and state (situational) influences. Empathy has been conceptualized to have anywhere from two (Rizzolatti & Craighero, 2004) to eight aspects (Decety, Jean & Ickes, William, 2011). A meta-analysis of research on empathy conducted by Elliott, Bohart, Watson, and Greenberg (2011) recommends dividing empathy into three aspects: emotional simulation, emotional regulation, and conceptual or cognitive perspective taking. The majority of the studies agree on at least two aspects of empathy: emotional and cognitive. Emotional simulation and emotional regulation can be considered aspects of emotional (affective) empathy. As evidenced by Rizzolatti and Craighero (2004), Decety et al. (2011), and Elliot et al. (2011), empathy can be divided into many components. Heinz Kohut's definition of empathy is simple and incorporates both the emotional and cognitive aspects of empathy that are included in much of the current research. He defined empathy as "the capacity to think and feel oneself into the inner life of another person" (Kohut, 1984, p. 82). It is important to understand both aspects of empathy, even though the empathy measure used in this study appears to address emotional empathy, and specifically the ability to recognize emotion.

The first aspect of empathy is emotional (affective) empathy, which can include emotional simulation and emotional regulation. Emotional simulation is a process in which a

person mirrors the emotions of another's physical experience; emotional simulation includes brain activation and mirror neurons. It simulates the elements of another's physical experience. Research on mirror neurons suggests that empathy includes a body-based empathic attunement with shared neural circuits (Gallese et al.,1996). Mirror neurons are neurons that fire both when an individual acts in a certain manner and when the person observes another person performing the same offense (Gallese et al., 1996). The presence of such neurons demonstrates the physiologically inherent capability of empathy through vicarious observations. Gallese et al. (1996) discovered mirror neurons while studying the brains of Macaque monkeys; Gallese et al. (1996) measured electrical activity from 532 neurons in the premotor cortexes of two macaque monkeys. The researchers observed that 92 of the 532 neurons discharged when the monkey grabbed a peanut or watched another do the same action, while these neurons did not activate when either the other monkey or the object was viewed alone. These neurons only activated when the observer saw the other monkey perform a behavior. Gallese et al. (1996) labeled these neurons "mirror neurons" and went on to state that their research suggested a "shared manifold of intersubjectivity" (Gallese 2003, p.171) through which it was possible to recognize other human beings as similar beings. He explained that these were the roots of empathy. It is important to note, however, that while this statement was made based on research done with monkeys, research has also evaluated the mirror neuron system in humans. Fadiga, Fogassi, Pavesi, and Rizzolatti (1995) researched whether the observation and execution matching mirror neuron system found in monkeys was also present in humans. They analyzed the motor cortex of

12 normal subjects through magnetic stimulation while they observed someone grabbing an object, looking at the same item, observing someone tracing figures in the air and detecting a light dimming. They found that motor evoked potentials (MEP) from hand muscles significantly increased when the subject was observing movement. Humans were considered to have a system resembling the one found in monkeys, both having mirror neurons (Rizzolatti & Craighero, 2004). Neurophysiological experiments with humans show that when human subjects observe another individual perform an action, their motor cortex becomes active, without any obvious motor activity. In these participants, a complex network is activated consisting of the occipital, temporal, and parietal visual areas, and two cortical regions whose function is predominantly motor (Rizzolatti & Craighero, 2004). In addition to the findings of Rizzolatti and Craighero (2004), Chaminade, Meltzoff, and Decety (2002) conducted a study consisting of ten healthy, right-handed men, with the average age of the participants being 24.2 years-old. The subjects were scanned using a PET scanner during six conditions. In the observation phase of each condition, subjects watched a video of a person moving a Lego block using the right hand. In the second phase of each condition, the subjects would make a similar action with a Lego block. PET scans were taken in each step of the six conditions. Chaminade et al. (2002) found that in addition to the expected neural similarities of seen and performed actions, imitating a gesture activates the neural pathways of the goal of the observed action. Imitation of the "means" activates a model of the goal that wasn't present in the observed movement. The idea of mirror neurons can be expanded to a broader understanding of the neuroanatomical elements of

empathy in which brain neurotransmitters may be important.

Research with humans and non-human primates suggests that oxytocin may play a role in prosocial behavior and empathy. Oxytocin (OT) is a hormone made in the hypothalamus and then carried to and secreted by the pituitary gland. It is also a neuropeptide that acts as a hormone and brain neurotransmitter. In mammals, it has been associated with mother, infant bonding and prosocial behaviors (Andari et al., 2010). Studies have suggested that the social deficits that occur with Autism Spectrum Disorder (ASD) are related to lower levels of plasma oxytocin. In a study by Green et al. (2001), 28 male subjects (97 ± 20 months) were compared with 31 age-matched non-psychiatric control subjects (106 ± 22 months). Plasma OT (bioactive form) and OT-X (C-terminal extended peptides OT-Gly, OT-Gly-Lys and OT-Gly-Lys-Arg) were measured in each group. The findings indicated significant differences in the sample with ASD including a decrease of plasma OT, an increase in OT-X and the ratio of OT-X/OT. The study concluded that children with autism had differences in OT endocrine system function and OT peptide processing (Green et al., 2001).

Based on the research supporting the relationship between oxytocin and prosocial behaviors, a study by Hurlemann et al. (2010) ran double-blind experiments with 76 healthy adult men. The researchers administered intranasal OT to the experimental group and an intranasal placebo to the control group. After treatment with OT, the levels of emotional empathy in the treatment group of men were raised to the higher pretreatment levels of emotional empathy in women. The intranasal OT also increased the advantage of social reinforcement in

increasing emotional empathy in response to stimuli, though there were no significant differences in the levels of cognitive empathy. The study suggested that emotional empathy was amygdala dependent and affected by OT. Intranasal OT treatment has also been effective in increasing aspects of empathy in subjects with ASD. Aoki et al. (2014) ran a double-blind placebo controlled crossover within subject trial with 17 males with ASD and 17 typical males. Before treatment, the ASD group had less activity than the control group in the right anterior insula and posterior superior temporal sulcus when guessing the emotions of others and in the dorsomedial prefrontal cortex when inferring others' beliefs. Intranasal oxytocin increased the correct rate of guessing others' emotions, and it improved right insula brain activity while inferring emotions but not dorsomedial prefrontal activity while inferring beliefs. This study confirmed the findings of the Hurlemann et al. (2010) study in that OT seems to affect emotional empathy but not cognitive empathy. This study went further to suggest that OT therapy could potentially decrease some of the deficits in emotional empathy associated with autism.

Also interesting is research that indicates that mirroring or imitation may act in a similar way to the intranasal oxytocin. A study by Field, Field, Sanders, and Nadel (2001) was conducted with 20 non-verbal children (10 girls, 10 boys) age 4 -6 (M=5.4) with a diagnosis of autism. They reported that after imitation the children spent less time showing typical behaviors of children with autism, they spent more time playing, vocalizing or smiling with an adult, and more time showing imitation recognition and participating in reciprocal play. The ideas derived from this research were expanded by a study by Delaveau, Arzounian, Rotgé, Nadel, and Fossati

(2015) with six high-functioning male adults with ASD (age 23 ± 4.9) using functional magnetic resonance imaging (fMRI) with the first image taken before a session where subjects were imitated and the second image taken after the session. There were two conditions: the first was watching the experimenter's hand move and the second was having their hand movements imitated. There were three runs for each subject. Each run consisted of two 30 second blocks with each of the conditions randomly ordered. Video cameras captured the hand gestures and displayed them to the subject lying in the scanner, so the scanning could happen while the sessions were in progress. The results found that both oxytocin and being imitated activate the right insula. It appears that imitation and "mirroring' can contribute to increased emotion empathy.

Emotional regulation can be considered another component of emotional empathy. It is also sometimes described as the ability to manage the negative emotions that may emerge through understanding the pain of another. The emotional regulation allows an individual to emotionally regulate feelings towards another person by taking a third person perspective instead of merging with the person's experience, and research findings reveal substantial differences in the neural systems involved in first and third person perspective taking. A functional magnetic resonance imaging (fMRI) study conducted by Jackson et al. (2006) with 34 healthy participants (aged 29 plus or minus 6.5) years had participants look at pictures of people in pain and not in pain and told them to imagine and rate the pain from different perspectives. The study suggests that the neural network used in pain processing was used with both cognitive and affective

empathy (Jackson et al., 2006), including the parietal operculum, anterior cingulate cortex (ACC), and anterior insula. With the self-perspective, the neural pain network was involved more extensively in the ACC, secondary somatosensory cortex, and the insula. The authors suggest that emotional self-regulation is the ability not to lose oneself in the pain of the other while seeing their perspective. (Jackson et al., 2006).

The second aspect of empathy is cognitive empathy which can be considered a cognitive *perspective-taking* process. Research has supported the idea that cognitive empathy is distinct and different from emotional empathy because they activate different of the brain as reported in a study conducted by Shamay-Tsoory et al. (2009). This study tested the hypothesis that cognitive empathic abilities exist and are different from those related to emotional empathy (mirror neuron system) and that different anatomical parts of the brain are involved. Shamay-Tsoory et al. (2009) suggest that brain lesions in specific areas of the brain can affect the levels of different types of empathy. Their sample included neurological patients who had damage that was either confined to the ventromedial prefrontal cortices (n=11, mean age=36.45), the inferior frontal gyrus (n=8, mean age =32.75), or posterior lesions (n=11, mean age = 38.00). The participants were given empathy measures that had both cognitive and affective components. Shamay-Tsoory et al. (2009) found that individuals with IFG damage had deficits in emotional empathy, and persons with VM damage had deficits in cognitive empathy. This research suggested that a significant anatomical difference existing between the areas of the brain involved in the two types of empathy, meaning that cognitive empathy is distinct from emotional empathy. The

findings from a meta-analysis conducted by Fan et al. (2011) were consistent with the results found by Shamay-Tsoory et al. (2009) and suggested that affective (emotional) empathy is associated with increased insula activity, activity in the midcingulate cortex, and that cognitive empathy results in activity in the dorsomedial prefrontal cortex (MCC/dmPFC). Eres et al. (2015) combined an MRI study with an empathy questionnaire. The study involved 176 participants, 88 of which were female, with the average age being 22.07 years-old and the standard deviation for age being 4.82 years. They found that affective empathy was distinct from cognitive empathy. They concluded that gray matter density could predict scores from an empathy measure. Higher affective empathy was paired with a greater density of gray matter in the insula cortex. Higher cognitive empathy was paired with a greater density of gray matter in the MCC/dmPFC. When taken together, Fan et al. (2011), Shamay-Tsoory et al. (2009), and Eres et al. (2015) makes a strong case for empathy consisting of at least two components.

In addition to the debate regarding the different components of empathy, there has also been conflicted relating to the nature of empathy, specifically regarding the stability or variability of this trait across the lifespan. Empathy, in the past, was largely considered to be a stable personality trait which remained constant over much of the course of an individual's lifespan (Davis, 1990). There is a clear biological component of empathy presented in much of the research with prefrontal cortex involvement. For example, a study (Spinella, 2005) conducted in a community setting with a convenience sample of 13 to 65-year-olds (N=101; 50 females, 51 males) demonstrated a clear correlation between aspects of empathy and prefrontal

cortex dysfunction. This study analyzed the relationship between self-rating scales of prefrontal-associated functions (FrSBe) and empathy (IRI). The study suggests that there is a significant inverse relationship between prefrontal system dysfunction and empathy (Spinella, 2005). Also, research has demonstrated that brain abnormalities have contributed to differences in empathy including individuals with neurodevelopmental disorders. A study of 26 students (ages 6-11) with an autism spectrum disorder and 37 normally developing students (ages 6-7) (Butean et al., 2014) measured the difference in the level of empathic responses between the two groups. In this study, an experimenter pretended to hurt his leg (he fell and said ouch) while retrieving a book from the room with the subject. The response of the subject was recorded. Butean et al. (2014) found that students with autism spectrum disorder showed a lower level of empathy in the areas of affective responding, behavioral activation, and prosocial behaviors than their typically developing peers. Studies that tie empathy to brain abnormalities or neurodevelopmental disorders help support the idea that empathy must be a stable trait, an aspect of individual neurology integrally connected to stable features of brain biology.

While many studies link brain abnormalities to decreased levels of empathy, other research suggests that empathy can be learned. If the latter is true, and empathy levels can be subject to change, it is possible that empathy can be taught. Studies involving neural plasticity suggest that empathic abilities can change as the individual interacts with the environment. The following studies support the idea that empathy can be learned and an individual's level of empathy can evolve. A recent study suggests that empathy is a construct that may be able to be

taught (Georgi et al., 2014). To test the hypothesis that training and experience in interacting with clients or patients increase empathy levels, Georgi et al. (2014) gathered a sample of 3,275 German university students (2,317 females and 958 males) from 71 student university associations. Participants were divided into three groups: a group of medical students, a group of students studying academic and social professions (training to be psychologists, teachers or social workers), and a control group of students pursuing other professions. Participants were asked to complete an online empathy measure. Georgi et al. (2014) found that medical students scored significantly higher than the control group on several empathy scales, and the group of students in the social professions scored statistically significantly higher than the control group on all the empathy scales. The medical students scored highest in cognitive empathy, and the social, professional students scored the highest (and greater than the medical students) in affective empathy (Georgi et al., 2014). The internal validity of this study was affected by the ambiguous temporal precedence. With no pretest before beginning the course of study, it is not clear whether empathy developed in the study process, or whether students were drawn to various professions because of the previous levels of empathy they possessed. Although Georgi et al. (2014) indicated that the results suggested that empathy can be learned, with no random assignment to groups and no pretest before their training, it is not clear from this study whether empathy was learned or whether empathy led to the choice of program. However, other studies more clearly show that attitudes that can contribute to empathy can be learned by placing participants in a simulated experience of seeing something from another person's perspective. A

quasi-experimental study with a pretest and posttest design was conducted in Taiwan to test the effect of an aging simulation program on the attitude and knowledge nursing students have about the elderly population (Yu & Chen, 2012). The design of this study was an improvement over the previous study, as this study accounted for variables such as profession and the maturation effect. A convenience sample of 83 nursing students was used as participants and divided into a quasi-experimental group (n=43) and a control group (n=40) based on which nursing home employed them. The experimental group participated in a one-hour lecture on aging and a one-hour simulation of aging. The control group continued with their routine with no intervention. The experimental group showed significantly more improvement in attitudes towards aging individuals after experiencing the simulation than the control group (Yu & Chen, 2012). While this study did not measure empathy, it measured an improvement in attitude that resulted from an empathic experience of metaphorically walking in another's shoes, and perspective taking is considered an aspect of empathy. The lack of random sampling weakened the external validity of the study. The authors suggest that adding random sampling would strengthen their findings (Yu & Chen, 2012). Additional limitations of the study are that the measures used were created for the study, even though clarity and suitability of the instruments were tested, and that there is a lack of random assignment and limited internal validity in the study. These two studies, despite their weaknesses in design, suggest that it may be possible to teach aspects of empathy.

If empathy can be learned, then a school environment could have a significant role in empathy development among students. Unfortunately, few studies research interventions that

target only empathy. However, significantly more research exists examining interventions that target social and emotional learning which include empathy. Significant support for the value of social and emotional learning comes from a meta-analysis of 213 studies which included more than 270,000 students conducted in association with the Collaborative for Academic Social and Emotional Learning (Durlak et al., 2011). The meta-analysis indicated that students who participated in an evidence-based social and emotional learning (SEL) program showed an 11% gain in academic achievement (Durlak et al., 2011). The effectiveness of the SEL program, RULER, which stands for recognizing, understanding, labeling, expressing, and regulating emotions has been researched (Nathanson et al., 2016). The RULER study was a two-year cluster randomized controlled trial that took place using fifth and sixth-grade classrooms from 62 schools. The classrooms that participated in RULER demonstrated greater emotional support, better class organization, and more instructional support than the classrooms in the control group at the end of the two-year period. This study indicated that an SEL program could contribute to increased emotional regulation, which is considered an aspect of empathy. Consistent with the observations by Durlak et al. (2011) and Nathanson et al. (2016), Schonert-Reichl et al. (2015) also observed that an SEL intervention could improve aspects of empathy. A randomized study of a Social-Emotional Learning program (SEL) that incorporates mindfulness (MindUp) was conducted with Canadian fourth and fifth graders (n=99) age 9.00 to 11.6 years M=10.24 (Schonert-Reichl et al., 2015). The intervention was conducted over a 12-week period with participants tested both before and after the program. There was a control group that received a

business as usual (BAU) social responsibility program. The group differences were examined in many areas including hypothalamic-pituitary-adrenocortical (HPA) regulation, self-report empathy, perspective-taking, optimism, emotional control, school self-concept, depressive symptoms, mindfulness, social responsibility, and math grades. Schonert-Reichl et al. (2015) observed that students who participated in the mindfulness program showed greater empathy, perspective taking, emotional control, as well as improved cognitive control. The observations made by Schonert-Reichl et al., (2015) indicate that SEL training that included mindfulness was correlated with improved positive behavior and cognitive change in children. When contrasted with the children in the social responsibility program, MindUP children showed increased well-being, prosocial behavior, and improved math grades. This study adds to the literature on the value of social and emotional learning and the impact that it can have in cognitive areas such as math and academics. The limitations of the study include a small number of classrooms that participated which limited statistical power. Also, regarding teacher and peer assessments, the raters were not blind to the treatment conditions. Despite these issues, this is a fascinating study. It was unique in that it examined the improvement made in multiple aspects of empathy, cognition and academic success from an SEL program. Together this study and the previous studies suggest the value of an SEL intervention in increasing empathy, prosocial behaviors, and cognition.

Increasing empathy in students is frequently one of the goals of an SEL program. One reason is that research supports the idea that higher levels of certain aspects of empathy can

predict prosocial behaviors, which are desirable in schools. A study by Litvak-Miller, McDougal, and Romney (1997) suggests that both empathic concern and perspective taking (aspects of empathy) were significant predictors of prosocial behavior. This study consisted of 478 second, fourth, and sixth-grade students, 49% male (n=236) and 51% female (n=242) from five schools in Canada. In the study, each child was assessed using empathy and altruism measures. The children then viewed a film, *Foster Parents Plan*, about a family living in poverty and were asked to imagine themselves living in a similar situation. The children were later given an opportunity to donate time or money to the cause, with each child's decision recorded. Higher levels of empathy on the empathic concern and perspective taking scales significantly predicted higher levels of prosocial behavior through time or money donations. Litvak-Miller et al. (1997) also observed that there were differences in scores across age groups, with students in higher grades performing better than students in lower grades. A gender gap was also found, with girls scoring higher than boys on the perspective-taking scale, the personal distress scale, and the emotional concern scale (Litvak-Miller et al., 1997) supporting a potential difference between males and females on empathy. Consistent with the findings by Schonert-Reichl et al. (2015) and Litvak-Miller et al. (1997), additional research by Flournoy et al. (2016) supports the ability of empathic concern to predict prosocial behaviors. A longitudinal study was conducted with data collected at two points from the participants (N=57) at age 10 and later at age 13. The subjects completed empathy and prosocial behavior assessments and underwent functional magnetic resonance imaging (fMRI). Initial empathic concern (EC) predicted future

prosocial behavior and initial personal distress (PD). EC also predicted reaction in the inferior frontal gyrus (IFG) and the inferior parietal lobule while looking at pictures of faces with various emotions. The IFG is a region linked to mirror neuron processes and control of cognition and was a mediator between EC and future prosocial behavior (Flournoy et al., 2016). These studies support the ability of empathic concern to predict prosocial behavior. These findings connect empathy and prosocial behavior in a way that may suggest value in increasing empathy development in schools to support improved prosocial behavior. An additional study conducted by Batanova and Loukas (2012) suggests a possible connection between feeling connected at school, having empathy, and having the ability to handle conflict. Batanova and Loukas (2012) examined the relationship between empathic concern, perspective-taking, school connectedness, and parent-child conflict. The study, which involved 487 students ranging in age from 10 to 14 years old, found that parental conflict and school connectedness have different socializing effects on girls' and boys' later empathic concern and perspective taking. For males, higher levels of school connectedness predicted higher levels of empathic perspective-taking one year after the intervention (Batanova & Loukas, 2012). It should also be noted that, in girls, school connectedness appeared to have a buffering effect regarding how negatively parental conflict impacted these participants. Despite some issues with internal validity, results suggest that there is value in creating school environments in which the students feel more connected. Together these studies suggest that higher levels of empathy and other non-cognitive factors can have multiple benefits including increasing prosocial behaviors and buffering conflict at home.

In addition to SEL programs' potential effects on increasing prosocial behaviors and buffering conflict at home, research suggests that school interventions that include socio-emotional learning (SEL) designed to teach social skills (including empathy) may contribute to an increase in academic performance. In a meta-analysis, Yeager and Walton (2011) looked at several brief social-psychological interventions designed to address the thoughts, feelings, and beliefs that students hold about school. They found that short SEL interventions could have surprisingly significant long-term results in their effectiveness in increasing academic achievement. One of the studies discussed was conducted by Cohen, Garcia, Apfel, and Master (2006) with seventh-graders from a suburban middle school. The students were middle to lower-middle class families. African American students (n=119) and European American students (n=124) participated in the study. The teachers who participated were blind to the students' assigned condition. They handed each student closed envelopes containing an exercise packet, and the students were told to follow the written instructions on the packet. The exercise, which took 15 minutes and presented as a regular class assignment, asked the students in the experimental group to note two or three values which they believed to be the most important from a list of values, including relationships and things that might be strengths. The treatment group wrote a paragraph about why their values were important to them, and the treatment group discussed why the values mentioned might be important to someone else. They then indicated their level of agreement with statements such as "I care about these values" or with the control group "some people care about these values." One exercise was completed in the first study and

two in the second study. Cohen et al. (2006) found that a 15-to 20-minute writing exercise reflecting core personal values appeared to help reduce the gap in achievement between African Americans and European Americans by 40% within one semester. Another study by Walton and Cohen (2011) used a randomized controlled trial (N=92) with 49 African-American students and 43 European-American students. The intervention was one hour long and discussed social challenges in school as a shared school experience that was part of the regular college adjustment process, instead of attributing the challenges to themselves or their ethnic group. They also read a report of seniors that discussed how as college progressed their sense of belonging increased. Lack of sense of belonging was presented as a common and temporary experience. Participants wrote an essay explaining how their experiences were similar to the experiences in the survey, and they were videotaped reading their essay with the belief that it would be used to help future students. The control group had a similar intervention with other topics not related to belonging. Over a three-year observation period, the African-American students in the intervention group had a significantly higher GPA compared to the African-Americans in the control group. It cut the minority achievement gap in half and reduced the number of doctor visits for the three years following the intervention. The observations of Cohen et al. (2006) and Walton and Cohen (2011) indicate that a brief SEL intervention in the area of social belonging can have long-term consequences in the field of achievement and health. Together these studies indicate that even a small SEL intervention can have a profound impact on academic achievement.

In addition to the benefits SEL interventions can have on academic achievement, SEL

interventions that include empathy development in schools can have a positive impact on decreasing behavior problems that can lead to bullying. Empathy development is a fundamental component of *Disarming the Playground: Violence Prevention through Movement & Pro-Social Skills* curriculum (Kornblum, 2002). An evaluation of Kornblum's body-based violence prevention curriculum was conducted with all the children in three second-grade classrooms (n=56, male=35, female=21) (Hervey & Kornblum, 2006). The classrooms included 33-50% special needs or at-risk students, increasing the behavior management issues in the classrooms. The students were evaluated with a pretest and posttest that were approximately seven months apart. Hervey and Kornblum (2006) observed that the curriculum was effective in decreasing problem behaviors and increasing self-regulation, nonverbal attunement, and empathy. The weaknesses of this design included a lack of a control group, as well as the small, nonrandom sample. Some issues with internal validity included selection and maturation (with the absence of a control group). There were additional concerns regarding the external validity, given that the study was carried out within only one school with a unique population that included an increased number of children with special needs. In this study, empathy was a component of an SEL intervention designed to decrease school violence.

There are few studies that examine empathy as an isolated construct. The following studies are specific empathy interventions designed to decrease violent behavior. A study that evaluated the success of an empathy training intervention on bullying behavior in sixth graders was conducted in Turkey by Şahin (2012). The study used an experimental design with an

experimental group and a control group. Sixty-one sixth grade students exhibiting bullying behaviors were selected as potential subjects. Thirty-eight were chosen by random selection to be included in the study. The researcher then used random selection to divide the students into four groups. There were two groups of 9 students and two groups of 10 students (Şahin, 2012). Two of these groups were experimental groups and two were control groups. The study found that empathy in subjects in the experimental groups increased significantly while aggressive behavior decreased when compared to the control group. Another study of an intervention that aimed to expand empathy and decrease aggressive behavior was conducted in Spain by Castillo et al. (2013). This study was designed to examine the effects on empathy and aggression of a two-year school intervention using the ability model of emotional intelligence (EI). The intervention was conducted in eight public high schools with a total of 590 adolescents (46% boys) age 11- 17 (mean age 13.83 years). There was an increase in empathic concern in the posttest for males but no difference in the perspective taking aspect of empathy. Female subjects had higher empathy scores, to begin with, and did not show the significant difference in the posttest that the boys did. One limitation of the study is mono-method bias given that all measures were self-reporting. This study was interesting in that it pointed out that a social-emotional learning intervention could have different results in empathy development depending on gender and depending on levels of empathy at the beginning of the study. Despite the limitations, the observations of Şahin (2012) and Castillo et al. (2013) indicate positive benefits that result from school interventions that include socio-emotional learning. However, it is

important to note that both these studies were conducted in other countries which may not necessarily generalize to schools in the United States.

Empathy has been defined and conceptualized in many ways in the past. While once thought of as a stable, unchanging personality trait, evidence now suggests that despite the biological components of empathy, an individual's empathic abilities can be strengthened. It is now recognized that empathy contains trait and state influences, as well as cognitive and affective elements (Cuff et al., 2016). Research supports the effectiveness of social-emotional learning school interventions in increasing prosocial behavior, academic achievement and decreasing bullying and aggressive behavior among students (Durlak et al., 2011; Yeager & Walton, 2011). Castillo et al. (2013) and Kornblum (2002) found specific increases in empathy as a result of the interventions.

The ability to think critically and to be empathic do not develop independent of other factors, but rather evolve in a nonlinear manner, as is the natural course of development of the brain (Hawk et al., 2013; Taylor et al., 2013a). That empathy and critical thinking are developed according to the maturation of the brain suggest that neither empathy nor critical thinking can be fully examined without taking into consideration brain development. Neurological changes that occur during adolescence include reductions in the volume of gray matter, due to the process of synaptic pruning and fluctuations in the volume of white matter, dependent on the individual's age (Taylor et al., 2013b). This increase in white matter is particularly important as the myelin that coats the neural axons acts as an insulator and increases the speed of neural transmissions up

to 100-fold (Blakemore & Choudhury, 2006). Additionally, there are notable fluctuations in the Intelligence Quotient (IQ) over the course of puberty, potentially influenced by the changes mentioned above in the white and gray matter during this time (Taylor et al., 2013b). Synaptic pruning is an experience-driven process so that when adolescents engage in activities that stimulate executive functions, the neural networks are not pruned away, but rather the dendrites and synapses become linked, leading to stronger learning pathways. However, natural changes that occur in the brain's neural networks may explain observed nonlinear trajectory of cognitive development (Blakemore & Choudhury, 2006; Taylor et al., 2013b). The nonlinear course of development is highlighted by a study conducted by Taylor et al. (2013a) which included 98 participants recruited from local universities, high schools, and youth organizations. The participants were sorted into three age groups: 17-year-olds (n=31), 18-year-olds (n=31), and 19-year-olds (n=36); the three groups were similar in terms of gender ratio, reported drug and alcohol use, and scores on a measure of intelligence (Taylor et al., 2013a). The variation regarding normative pubertal development across age groups did not mediate performance on social cognition or executive function tasks. The levels of negative mood states and anxiety were found to be slightly higher in the 19-year-old age group when compared to the other two groups. Taylor et al. (2013a) observed that 17-year-olds performed better than 18-year-olds on four task related subscales: number of correct tasks, description, recognition, and perception. The 17-year-olds performed better than the 19-year-olds on two of the subscales: the number of correct free sorts and the description score for perceptual sorts. The observations made by

Taylor et al. (2013a) suggest that the development of cognitive abilities is nonlinear, with the decrease in scores observed in the 18-year-old and 19-year-old groups the product of natural reorganization of neural networks (Taylor et al., 2013a). Similarly, the development of empathic ability does not occur in a steady, linear fashion, but rather occurs alongside brain development, so that discontinuous patterns of brain development during adolescence cause a temporary drop in the individual's empathic abilities (Hawk et al., 2013). During adolescence, an individual's main empathic response, which was once a self-oriented distressed view, progressively shifts towards an empathic response that considers the emotions and viewpoints of others (Hawk et al., 2013). The ability to recognize the emotions of others develops well into adolescence and allows for the individual to interact better socially (Decety, 2010). The capacity for emotional recognition increases as the brain matures. The dorsal and ventral regions of the prefrontal cortex, as well as the dorsal anterior cingulate cortex, are found to be most closely connected to emotional recognition (Decety, 2010). Empathy matures alongside brain maturation with the change of neural pathways going predominantly in the limbic system towards the frontal brain regions causing an individual to experience different emotional reactions to stimuli (Georgi et al., 2014). Regions of the brain that are mainly involved in an individual's empathic abilities include the amygdala, the anterior cingulate cortex, the medial and orbitofrontal cortices, the insula, and the superior temporal sulcus (Decety, 2010)

The prefrontal cortex is the area of the brain that is responsible for judgment, delayed gratification, emotional self-control, goal-directed behavior, and subsequently, critical thinking

(Taylor et al., 2013b; Watson & Breedlove, 2012). The executive functions of the prefrontal cortex are also activated with critical thinking (Panettieri, 2015). Additionally, the prefrontal cortex allows for greater social cognition and perception, verbal skills, planning ability, self-control and empathy (Hawk et al., 2013; Taylor et al., 2013b; Spinella, 2005). Those who can think critically may be more capable of being empathetic, as critical thinking skills and cognitive ability are an important component of the perspective-taking aspect of empathy. The prefrontal cortex is also necessary for perspective taking cognitive empathy, as evidenced by activation of the frontopolar cortex, ventromedial prefrontal cortex, frontopolar cortex, the ventromedial prefrontal cortex, the medial prefrontal cortex, and the right inferior parietal lobule with perspective taking cognitive empathy (Jackson et al., 2006). The prefrontal cortex is the last portion of the brain to fully develop, as full maturation does not occur until an individual's mid-twenties. The most rapid amount of growth in the prefrontal cortex occurs between the ages of 8 and 16 years-old. While other areas of the brain, such as the sensory and motor regions, undergo the process of myelination earlier, the neurons in the frontal cortex do not begin myelination until the individual reaches adolescence (Blakemore & Choudhury, 2006). As discussed above, the prefrontal cortex is broadening the neural networks during adolescence, which can be stimulated and enhanced through implementation of activities in the classroom designed to teach critical thinking and empathy.

CRITIQUE

The adoption and implementation of the Common Core standards marked a move towards standardizing the educational system in the United States. While uniformity in the curriculum within a school system is widely seen as beneficial, the Common Core standards do not include all the beneficial educational material that students would benefit from being taught; most notably lacking are empathy and critical thinking. The Common Core standards do teach basic critical thinking, but the critical thinking taught often does not extend beyond the basic level. Empathy is a concept that is not addressed by the Common Core standards at any level or in any area of study. Critical thinking taught at a level beyond what is necessary to meet the standards of the Common Core Curriculum would allow students to have better problem-solving abilities, as well as allow for students to communicate more efficiently (White, 2010). This increase in the effectiveness of the students' communication skills would be further aided by adding empathy to the curriculum. Higher empathy levels allow an individual to recognize the emotions of others better and take another's perspective (Hawk et al., 2013). Adolescents who can problem solve, understand the views of others, and communicate well would be better suited to navigating through adolescence and the world (Klapwijk et al., 2013).

Both critical thinking and empathy are constructs that are widely understudied, particularly in the middle school population. As seen from the data, students have limited opportunities to develop critical thinking and empathy in school. As discussed, both constructs are valuable. Critical thinking is useful because it allows for improved ability to analyze and

interpret information. In addition, it is related to future academic success, as well as to the promotion of empathy. Empathy is valuable for its reduction in bullying and increased academic success. Both empathy and critical thinking are skills that can be taught, as well as strengthened with practice (Panettieri, 2015; Şahin, 2012). The fact that these skills can be taught indicates that interventions designed to increase empathy and critical thinking can be implemented and reasonably expected to succeed. Class discussion, role-playing, and problem-solving have been indicated to increase the likelihood that critical thinking skills will develop (Abrami et al., 2015). The benefits of discussion regarding critical thinking acquisition were also shown in individuals who posted thoughts and questions on a peer message board (Yang, Newby, & Bill, 2008). Research suggests that interventions designed to increase critical thinking should be explicitly taught, instead of implicitly a part of the instruction (Howard et al., 2015; Kettler, 2014).

Past research has shown that interventions to increase empathy levels have been successful. A one-hour lecture and one-hour simulation of aging were shown to increase the levels of empathy for nursing students, and mindfulness training was shown to improve the levels of empathy among fourth and fifth graders (Durlak et al., 2011; Yu & Chen, 2012). Emotional intelligence training was shown to increase the levels of empathic concern, and increased levels of school connectedness predicted better perspective taking one-year after the intervention (Batanova & Loukas, 2012; Castillo et al., 2013).

Empathy and critical thinking have also been correlated with the development of the prefrontal cortex, with an individual's ability to think critically and empathetically increasing as

the prefrontal cortex matures (Hawk et al., 2013). Since both empathy and critical thinking can be taught, and both are associated with the prefrontal cortex, it follows that the individual would have greater ability to learn critical thinking and empathy skills after the brain has begun the process of shifting executive brain functions from the limbic system towards the prefrontal cortex (Georgi et al., 2014). This change in functioning happens in adolescence. While the brain is not fully mature until around the age of 25 years old, implementing interventions designed to increase empathy and critical thinking during adolescence, while the prefrontal cortex is still forming, would seemingly take advantage of the brain's plasticity (Hawk et al., 2013). The early learning of critical thinking and empathy skills would likely shape the development of the prefrontal cortex so that the individual is better able to learn and use these skills (Klapwijk et al., 2013). As discussed, research has shown the benefits of having strong empathy and critical thinking skills.

Implementing a curriculum that specifically addresses critical thinking and empathy in Middle Schools, during adolescence, would allow for the neural connections responsible for critical thinking and empathy to be strengthened during this time of significant neural plasticity (Taylor et al., 2013b).

The literature review indicates that empathy is not usually taught in a significant way as part of a standard school curriculum. There is more awareness about the importance of critical thinking in the curricula, and it appears that it will be increasingly present in the future. Middle school years are historically a challenging time with more separation from parents and

ties to peers becoming more important than before. During the middle school years, the brain is making significant changes, and bullying and other ways of expressing mutual dislike of others can emerge. Empathy and critical thinking can be valuable tools to help the adolescent navigate the difficult terrain of the middle-school years. Research has mentioned the limited inclusion of empathy and critical thinking in the school curriculum and has suggested positive benefits of adding interventions that address these vital areas to school curriculum including the value of teaching non-cognitive factors in school and in promoting social-emotional learning. The development of the prefrontal cortex in the middle-school years and the involvement of this area of the brain in both empathy and critical thinking suggest that middle-school would be an ideal time to implement this type of addition to the curriculum.

Research has indicated that psychological activity-based interventions have been effective in increasing empathy and critical thinking in school age children. While there have been studies that have examined interventions intended to build empathy or critical thinking, few studies focus on interventions designed to address both or to explore the relationship between these two factors. A lack of research exists that examines how effective these interventions would be when applied to adolescents, as well as how these two variables might interact with each other. There appears to be a need for research on the effectiveness of an activity-based intervention with middle-school students that addresses both empathy and critical thinking and examines the relationship between the two.

The current study addressed this gap in the literature by evaluating the effectiveness of

an intervention with middle school students designed to increase critical thinking and empathy skills. Three specific hypotheses were addressed.

H1: Middle school students who participated in an intervention that included a series of psychology-based social and emotional learning (SEL) activities, that occurred over a seven-week period, would demonstrate an increase in empathy.

H2: Middle school students who participated in an intervention that consisted of a series of psychology-based SEL activities, that occurred over a seven-week period, would experience an increase in performance on the following critical thinking scales: Mental Focus, Creative Problem Solving, Learning Orientation, Cognitive Integrity, and Scholarly Rigor.

H3: There would be a correlation between the change in the levels of empathy and the change in each of the five critical thinking scales after the middle school students participated in the SEL intervention program.

Chapter 3
Method

Participants

Participants consisted of 18 seventh-grade North Hall Middle School students, between the ages of 12.25 years and 13.67 years (M = 12.94 years, SD =.36 years). Out of the 18 individuals in the sample, 44.4% (n=8) were males, and 55.6% (n=10) were females. The study had few minority races represented, as 94.4% of the participants identified as Caucasian (n=17) and 5.6% of the participants identified as mixed (n=1).

Group 1 consisted of 10 students with the pretest conducted on October 29, 2015, and Group 2 consisted of 8 students with the pretest taking place on January 26, 2016. Participants were already enrolled in the E2 program, making them a convenience sample. They were scheduled before the study began to rotate through the "Be Healthy" class series. Approximately 10 to 20 participants rotated through this class series each seven weeks. The SEL activities were done during the "Be Healthy" rotation. All the students in the rotation participated, but the only data used were from students who had returned a signed informed consent form. Thirteen of the students (72.2%) had been involved in this intervention as sixth graders one year earlier. Only five of the students (27.8%) had no previous experience with the intervention.

The participants were among the 70 students enrolled in the Earhart-Edison Exploration Academy (E2) program, a program designed for gifted and talented students, and they attended Ms. Michele Hood's "Be Healthy" class series. Gifted and talented are both fluid concepts that may look different depending on the context. Students that are considered gifted or talented tend to have a heightened ability to reason and learn or documented performance in the top 10% or rarer in one or more domains. Some students may have an exceptional aptitude for a structured area such as math, language arts, music, etc., whereas other students may display superior talents

in areas related to sensorimotor skills such as painting, dance, or sports ("Definitions of Giftedness | National Association for Gifted Children," n.d.). To be considered for admission into the E2 program, rising sixth-grade students who are eager to learn and interested in one of the sciences, technology, engineering, or mathematics disciplines (STEM), must apply online. Students undergo a competitive application process during which their strengths and interests are evaluated for goodness of fit regarding the goals, specialized content, and instructional approaches of the E2 program ("Charter/Magnet Schools & Programs of Choice | Hall County Schools," n.d.; "North Hall Middle School » E2 Academy," n.d.). Students in this program are individuals with a high degree of creative or intellectual ability, are highly motivated, or excel in specific academic fields and require specialized instruction to achieve their full potential. Fifty-four percent of the students in E2 are considered gifted, and 46% are considered talented (M. Hood, personal communication, June 7, 2017). At the state level, students are evaluated for giftedness or talent based on performance in four areas: achievement, creativity, motivation, and mental ability. For a student to meet the requirements, he or she must meet acceptance criteria in three of the four categories, with the performance in one of the categories measured by a nationally-normed standardized test (M. Hood, personal communication, June 7, 2017). E2's required admission characteristics include internal motivation, collaborative, inquisitive/interest driven, risk takers/perseverance, problem-solving, and independent thinking. Whereas many sciences, technology, engineering, and mathematics (STEM) programs often emphasize science and math, the E2 program has a broader focus, with technology woven into all aspects of the curriculum. Additionally, the E2 program also has more focus on the agricultural sciences, due to the rural location of the school (M. Hood, personal communication, June 7, 2017).

It is also important to note that according to Ms. Michele Hood, the E2 Coordinator at the

time of the study, approximately 20% of the E2 students had a diagnosis of autism spectrum disorder (ASD) and were considered twice exceptional, which means an intellectually gifted child with some form of disability (M. Hood, personal communication, June 7, 2017). This is significantly higher than the prevalence of approximately 1% of ASD in the general population: (American Psychiatric Association, 2013). A study in 2012 of 8-year-olds concluded that there was an ASD prevalence of approximately 1.5% among eight-year-olds (Christensen, 2016). Those 8-year-olds would have been slightly younger than the 7th-grade E2 students in 2015 at the time of the North Hall Middle School study. It is clear that there was a much greater prevalence of ASD among the E2 students than the general population. Because the E2 teachers were trained in working with twice-exceptional students, the teachers were able to focus on some social/soft skills and collaborative skills that were relevant to the ASD population (M. Hood, personal communication, June 7, 2017).

Measures

The Reading the Mind in the Eyes Test, Child Version (RMET-CV, Baron-Cohen, Wheelwright, Scahill, Lawson, & Spong, 2001b) was developed to measure subtle cognitive deficits in individuals with autism spectrum disorder (ASD). Originally the measure was used as a measure of theory of mind, which is the ability to predict what someone else is thinking, similar to cognitive empathy (Oakley, Brewer, Bird, & Catmur, 2016). In typically functioning populations this measure has been used as a measure of empathy. However, Oakley et al. (2016) suggested through their research that the RMET-CV is more accurately a measurement of how someone is feeling, or emotional empathy, rather than a measure of theory of mind. It is clear that the assessment itself is a measure of emotion recognition because the subject is asked to identify emotions from looking at pictures of faces. Emotion recognition is a component of

emotional or affective empathy, but may not necessarily cover emotional simulation (the other aspect of emotional empathy). The current study used this as a measure of empathy.

The RMET-CV consists of 28 opportunities for the child to match the emotion and mental state descriptor words to photographs of eyes and the surrounding facial area. The test is designed to measure an individual's capacity to show empathy by testing his/her ability to interpret the emotional and mental state of another person through examining photographs of the eyes.

Administration can take place in a group or individual setting, and the administrator reads aloud the "Children's Eyes Instructions" (Baron-Cohen et al., 2001b). The child version consists of a response sheet and the pictures of the eyes. Beside each picture are four adjectives which are read aloud by the test administrator. The students are instructed to circle (on a response sheet) the adjective they think best describes the emotion portrayed by the eyes in the photograph. The test begins with one practice item for which no feedback is given; this is followed by 28 test items that each have a correct response. Each correct response is worth one point for a total possible score of 28. The test is scored by simply finding the sum of the correct answers with the range of scores being 0-28. A higher score indicates that the individual has a greater ability to interpret and show empathy. There are no subscales in this test, and the norms are unclear.

More reliability and validity data exists on the adult version of the test. However, there are studies which used the child version. Müller and Gmünder (2014) evaluated the RMET-CV and suggested that because this measure was intended for individuals with ASD, it may be an easy task for neuro-typically developing adolescents. The sample in this study consisted of 596 students comprised of 51% (n = 303) males and 49% (n = 293) females between the ages of 13

and 15. The students were in grades 7 through 9 and were attending seven different secondary schools throughout Berne, the Cantons of Valais, and Zurich Switzerland. Müller and Gmünder (2014) found poor internal consistency (α = .53, M=17.8, SD= 3.5) and a negatively skewed distribution of scores. In a study conducted by Demurie, De Corel, and Roeyers (2011) with young participants between the ages of 11 and 17 years-old, 19 of the participants had ASD, 16 had ADHD, and 18 were typically developing and served as a control group. Demurie et al. (2011) observed that participants with a diagnosis of ASD performed significantly worse on the RMET-CV than either of the other two groups. Demurie et al. (2011) noted that the results on the RMET-CV for the participants with ASD were similar to those found by other researchers, such as Baron-Cohen, Wheelwright, Hill, Raste, & Plumb (2001a). However, Demurie et al. (2011) found results that differed from those of Ponnet, Roeyers, Buysse, De Clercq, and Van Der Heyden (2004), who found no significant differences between the scores of individuals with ASD and controls on the RMET-CV. These discrepancies prompted Demurie et al. (2011) to note that other factors may influence performance on the measure. Baron-Cohen et al. (2001a) suggested that support for the validity of the Reading the Mind in the Eyes adult version is found in the fact that individuals with autism spectrum disorder (ASD) performed poorly on this measure. They also stated that it was a useful test to identify subtle impairments in social intelligence. Their study consisted of four groups. The first group consisted of only males (n=15) diagnosed with ASD or High Functioning Autism (HFA) who had taken the WAIS-R and scored within the normal range (M=115, SD=16.1). The second group consisted of 122 neuro-typical adults from community and education classes spanning various occupations and education levels. The third group consisted of 103 undergraduate students from Cambridge University 51.5% were male (n=53), and 48.5% were female (n=50). The fourth group consisted

of 14 randomly selected adults from the general population who were similar in age and IQ to the participants in group one (M=116, SD=6.4). Though not used as a measure of empathy, in this study the test served as a valid measure of adult social intelligence. There is some debate, however, over what construct this test is measuring. A study conducted by Oakley et al. (2016) included 19 individuals (5 female) with a diagnosis of Autism Spectrum Disorder (ASD) and 24 individuals (11 female) without such a diagnosis to serve as the control group. Oakley et al. (2016) made observations that led them to report that the Reading the Mind in the Eyes test detects the ability to recognize another's emotional state, not mental state (Theory of Mind) as had been previously concluded. Shamay-Tsoory et al. (2009) conducted a study to investigate which areas of the brain were utilized in emotional empathy and cognitive empathy. The study included 30 individuals with damage to either the ventromedial (VM) (n=11) or inferior frontal gyrus (IFG) (n=8). It was found that individuals with damage to the VM performed significantly worse on measures of cognitive empathy, while those with IFG damage performed significantly worse on measures of emotional empathy (Shamay-Tsoory et al., 2009). While the Shamay-Tsoory et al. study (2009) did not use the RMET-CV specifically as the measure of emotional empathy, the study did use a similar measure that the researchers designed for the study. The measure featured 52 images displaying basic and complex emotions and asked the participants to correctly identify the emotions displayed on the faces of the individuals in the pictures. There is research with other emotion recognition tests that use pictures of eyes that indicates that there is a correlation between emotion recognition and the personal distress scale (PD) on the Interpersonal Reactivity Index (IRI). The PD scale is one of two of the emotional empathy scales on the IRI and indicates anxiety and discomfort (Shamay-Tsoory et al., 2009).

This test was chosen for this study because it has been used in multiple studies examining

empathy (Baron-Cohen et al., 2001a; Shamay-Tsoory et al., 2009) with various populations, including ASD and non-ASD populations. The RMET-CV contains an important component of empathy, the ability to recognize emotion. The RMET-CV is also one of the empathy measures that has a specifically developed version for children that has been used in multiple studies (Baron-Cohen et al., 2001b; Shamay-Tsoory et al., 2009).

Additionally, the **California Measure of Mental Motivation CM3 II+ (CM3)** (Giancarlo, 1998) was utilized in this study to gather pretest and posttest data to measure critical thinking. The CM3 was designed to measure students' critical thinking skills and their attitude and motivation towards using these skills when an opportunity to think critically presents itself (Giancarlo, Blohm, & Urdan, 2004). The CM3 consists of 72 questions divided into four categories that require the students to rank the accuracy of statements from 1 to 4 on a Likert scale with answer choices ranging from "Agree Strongly" to "Disagree Strongly." The four categories on the CM3 are Mental Focus, Learning Orientation, Creative Problem Solving, and Cognitive Integrity. There is an additional category called Scholarly Rigor that is available for Level II of the online version of the test (Giancarlo & Facione, 2006). The Mental Focus category measures the individual's inclination towards the ability to mentally focus and consists of three primary factors. The three interrelated factors that make up the Mental Focus category are Process, Organization, and Attention. The Process factor measures the individual's comfort and frustration levels when he or she is required to complete a complex or intricate task. The Organization factor measures the individual's ability to be self-motivated and complete his/her work independently. The Attention Factor measures the individual's ability to stay focused on the task at hand. The Learning Orientation measures the individual's desire to increase his/her knowledge base and skill set. The Learning Orientation consists of two factors, Desire to Learn

and Information Gathering. Desire to Learn is designed to measure the individual's level of intellectual curiosity whereas Information Gathering aims to measure how much importance the person places on gathering reliable and valid information. The Creative Problem Solving (CPS) category was designed to measure whether the individual uses creativity when solving complex problems. The CPS has two factors: Innovation and Challenge Seeking. The Innovation Factor was intended to measure how a person may go about trying to solve a problem. Challenge seeking specifically measures the examinee's desire to work on difficult tasks. The Cognitive Integrity (CI) category was created to measure the individual's willingness to use the skills required to think critically. The CI category consists of two factors as well: Intellectual Curiosity and Fair-mindedness. Intellectual Curiosity measures the value seeking out information has to an individual, whereas Fair-Mindedness measures whether the examinee places value in weighing all the options before making a decision. Lastly, Scholarly Rigor measures the importance a person may place on gaining the ability to understand abstract and arduous information (Giancarlo & Facione, 2006).

The CM3 can be administered online or with a paper-and-pencil to a single individual or a large group all at once. The CM3 is untimed, but takes approximately 20 minutes to complete; however, if the administrator wishes for the CM3 to be timed, that is an option within the online version. When providing a description or explanation of the test, it is recommended that the participants are told that the CM3 is based on the individual's opinion, and therefore there are no correct or incorrect answers. When taking the paper-and-pencil version of the test, the examinee is given a test booklet and score record form. The test administrator may choose to read the questions aloud and have the examinees circle their preferred response or have the individuals read the question silently to themselves and then circle their answer (Giancarlo & Facione,

2006). For scoring, the completed CM3 paper-and-pencil questionnaires must be sent to Insight Assessment where they are scored, and the results are then sent back to the examiner. The online version of the CM3, however, is scored electronically, and the results are made available immediately (Giancarlo & Facione, 2006). The scores of the CM3 are based on a 50-point scale where each score represents a corresponding category (i.e. ambivalent). The following are the scores and categories: 0-9, Strongly Negative Disposed; 10-19, Somewhat Negative; 20-30, Ambivalent; 31- 40, Somewhat Disposed; and 41-50, Strongly Disposed.

The subscale scores on the California Measure of Mental Motivation CM3II+ (CM3) range from 0 to 50 on each scale. Each score is associated with a range from Strongly Negative (0-9), Somewhat Negative (10-19), Ambivalent (20-30), Somewhat Positive (30-40), and Strongly Positive (41-50). Moving from one range to another is indicative of attitudinal change.

On the Mental Focus subscale, scores within the Strongly Negative to Somewhat Negative range indicate that the individual may be more disorganized in their thinking, have a lack of focus, and be easily distracted. Scores within the Ambivalent range indicate those who are more organized, systematic, and timely sometimes, but not consistently. Scores within the Strongly Positive and Somewhat Positive range suggests the person is task oriented, systematic, organized, and focused.

For the Learning Orientation subscale, Strongly Negative and Somewhat Negative indicate a hostility or aversion to learning with the accompanying attitude being that studying and learning is not a useful way to accomplish goals. A score within the Ambivalent range indicates an inconsistent attitude towards learning and problem solving; at times, the person may study and put effort towards learning and other times he or she may not. A score within the ranges of Strongly Positive and Somewhat Positive indicates a desire to learn and curiosity.

Individuals who score within this range prioritize learning, engage in educational activities, enjoy gathering evidence, and recognizes the importance of providing support to validate their argument.

On the Creative Problem-Solving subscale, the Strongly Negative and Somewhat Negative ranges indicate an individual who rejects problem-solving and creative thinking. These individuals are not imaginative and do not enjoy activities that require tactical and strategic planning. Individuals whose scores fall within the Ambivalent range may on occasion seek out creative activities where they can contribute, but are unlikely to do so on a consistent basis. These individuals may at times show curiosity in how things work, and at other times show no interest at all. Individuals who fall within the Strongly Positive and Somewhat Positive ranges are more likely to experience intellectual curiosity, creativity, and enjoyment from being challenged. They are likely to seek out complicated and stimulating activities. These individuals are often seen as being imaginative, innovative, creative, and cognitively flexible.

For the Cognitive Integrity subscale, individuals who fall within the Strongly Negative and Somewhat Negative ranges are often closed-minded and exhibit an intolerance towards the ideas of others. These individuals display a lack of interest in learning new things, particularly if it may conflict with their established ideas. Individuals whose scores fall within the Ambivalent range will on occasion listen to the ideas of others, but do so inconsistently. These individuals are often apathetic towards learning and show only mild interest in researching the facts on which to base their decisions. Individuals who fall within the Strongly Positive and Somewhat Positive range are motivated to think critically to solve problems and are open-minded regardless of the issue.

On the Scholarly Rigor subscale, individuals who score within the Strongly Negative and

Somewhat Negative range tend to avoid learning and increasing understanding. These individuals are only interested in having a surface knowledge at best and avoid learning things they deem too complex. Individuals who fall within the Ambivalent range will on occasion put forth serious academic effort, but do so inconsistently. These individuals are more inclined to procrastinate than to engage in the learning process actively. Individuals who fall within the Strongly Positive and Somewhat Positive ranges are inclined to engage in difficult academic endeavors and strive to gain a deeper understanding of the material.

The calculations Insight Assessment uses to score the paper and pencil test are not listed in the manual, and there are no norms reported for the CM3 (Giancarlo & Facione, 2006). Reliability for the CM3 was measured using the students from three different schools. However, the ages and grades were not specified. The reliability of the measure was shown by the alpha coefficients for each subscale: .79-.83 for Learning Orientation, .70-.77 for Creative Problem Solving, .79-.83 for Mental Focus, and .53-.63 for Cognitive Integrity (Giancarlo & Facione, 2006). These alpha coefficients demonstrate adequate reliability, as an alpha coefficient of .7 is considered to be the lowest acceptable level. Therefore, all are acceptable, though the alpha coefficient for CI is a little low. There were no estimates listed for the subscales (Giancarlo & Facione, 2006). Predictive validity was established by using scores on the CM3, the Preliminary Scholastic Aptitude Test (PSAT/NMSQT), the Stanford Achievement Test (SAT9), and GPA. The resulting correlations ranged from r=.15 between the PSAT and CI to r=.46 between GPA and CPS. Discriminant validity was indicated by the finding that there was no significant relationship between scores on the CM3 subscales and the Marlowe-Crowne Social Desirability Index (Giancarlo & Facione, 2006). Giancarlo and Facione (2006) recommended that the interpretive manual is updated to include normative results, and suggested that, until such data is

available, the CM3 is considered an experimental instrument.

Procedure

The sample was a convenience sample selected from seventh-grade students at North Hall Middle School's Earhart-Edison Exploration Academy (E2) program. This sampling method was considered due to an established relationship with this school, as well as faculty interest in having the students participate in the stated interventions; this sampling method could be implemented once the researchers received approval from both Brenau University Institutional Review Board (IRB) and the Hall County school board.

Protection of human subjects included obtaining a completed informed consent from each student participating and maintaining the confidentiality of participants. The parents of 7th-grade E2 students received an informed consent in both a hard copy format and an email version. Data was kept confidential in several ways. Subject numbers were assigned to matched assessment and consent forms. The identifying information on the assessment forms was removed. All the completed forms for the study were then placed in the locked research office in the Psychology Department building. The researchers accessed the data in the Psychology Department and entered it into an SPSS dataset using subject numbers. No names were included in the dataset.

Only students who returned the parental informed consent form were asked to complete the RMET-CV and the CM3 before the implementation of the treatment program. Students also completed an anxiety measure, though the anxiety measure was not being used in the current study. It took students approximately 40-60 minutes to complete the pretest measures. For seven weeks after the pretest, researchers led a group of 10 to 20 middle school students through several in class activities on Tuesday, Thursday, and Friday mornings. The Tuesday and Friday meetings with the students lasted approximately 35 minutes, while the Thursday meetings with

the students were approximately one hour. The group contained the same students for seven weeks; those students completed a pretest, the 11 of activities carried out across seven weeks (See Table 1), and then a posttest with the same measures. After seven weeks, the initial group of students rotated out, and a new group of students began. Data was collected for two of these cycles during this study. Following the final activity, the students again completed the empathy, critical thinking, and stress/anxiety measures, which again took approximately 40-60 minutes. This process was completed for each group that rotated through Ms. Hood's "Be Healthy" rotation during the 2015-2016 school year. The students were given the opportunity to discuss and ask questions throughout the intervention and after they completed their rotation.

Table 1

Social and Emotional Learning Intervention Activities

Purpose	Activity Name	Description
Icebreaker/Teambuilding Activity	The Monkey Game	Students toss many soft objects (balls, stuffed animals, etc.) around a circle in the same order while a stuffed monkey is thrown in a random order. Discussion ensues about expected and unexpected stressors.
Build empathy through the process of increasing non-verbal communication and awareness of others.	Tower Activity (Nonverbal Communication Activity)	Groups of students worked in silence using supplies to build a tower. Discussion ensued about nonverbal communication, challenges when working in groups, and strategies used to address the challenges.
Learn about careers in psychology.	Career Exploration in Psychology (Includes Projective test, perceptual goggles experience, difference thresholds, Stroop Test, and a memory exercise)	Included an introduction to types of careers in the field as well as exposure to related activities.
Myers-Briggs Type Indicator, increase self-knowledge and build an appreciation of classmates' differences, to promote empathy.	Myers-Briggs Activity	Discussion of personality types, informal identification of students' types, and exploration of ways to work with other personality types on group projects. Build appreciation of individual differences.
Critical thinking regarding alcohol use and driving.	Fatal Vision Activity	Addressed the physiological and psychological effects of alcohol, included a structured experience with Fatal Vision goggles, then a processing session.

Purpose	Activity Name	Description
Increase cultural awareness and build empathy and critical thinking	BaFa	Cultural simulation experience followed by group processing.
Ostracism Activity to facilitate empathy	O-Train	Simulation of ostracism on a train. Followed by a discussion about ostracism and safeguards against ostracizing others.
Skills for stress and anxiety reduction.	Progressive Muscle Relaxation	Students practiced progressively tensing and relaxing muscle groups to attain optimal relaxation. Students were encouraged to practice at home between in-class instruction. Psychoeducation about neuropsychology was provided at this time.
To understand and think critically about stress and develop skills for reducing test anxiety	Test Edge Activities included What is Stress? Stress Symptoms Survey, Freeze Frame, Building Your Focus	Portions of the Test Edge program, developed by the Institute of HeartMath, were used to teach middle school students about the connection between emotions, attitudes, and academic work. The focus was on how anxiety can inhibit cognitive performance and on developing skills for reducing test anxiety.
To build empathy towards older adults and promote critical thinking about the challenges faced by this population.	Simulation of Aging Activity	15-20-minute introduction about aging, including dementia, followed by simulation of aging, concluded by group processing.
To build empathy through movement activities	Name Game, *We all stop together, Who is the mirror?* Team building activity with a stretch cloth	Dance-movement therapy activities from Kornblum's *Disarming the Playground: Violence Prevention Through Movement* curriculum (Kornblum, R., 2002) were used to increase levels of empathy.

Chapter Four
Results

Preliminary Results

In this study conducted at North Hall Middle School, scores on the Reading the Mind in the Eyes Test, Child Version (RMET-CV) ranged on the pretest from 7 to 25 (M= 19.83, SD= 4.14). Scores on the posttest for the Reading the Mind in the Eyes Test ranged from 2 to 26 (M = 19.94, SD = 5.40). Although no normative data exists, other studies have reported data on this measure, and the results of such studies can be used as a mean for comparison. Both pretest and posttest scores in the current study fell within one standard deviation of scores from the Moor et al. (2012) study of typically developing children aged 10-12 (M=19.5, SD=2.4), as well as scores of typically developing children aged 14-16 (M=17.9, SD=2). Moor et al. (2012) studied a sample of 10-12-year-olds (n=19) with an average age of 11.6 years-old (SD=1) and found a mean score of 19.5 (SD=2.4). Another study by Moor et al. (2012) studied a sample of 14-16-year-olds (n=16), where the average age was 15.7 years-old (SD=.08) and found a mean score of 17.9 (SD=2.6). A study by Demurie et al. (2011) of adolescents (n=18) with a mean age of 13.9 (SD=1.7) reported a mean score of 19.2 (SD=2.6). Tonks, Williams, Frampton, Yates, and Slater (2007) conducted a study using a sample of 67 adolescent participants with an average age of 11.9 years old (SD=1.7) and reported a mean of 19.3 (SD=3.7). One study Baron-Cohen et al. (2001b) had a slightly higher means when then tested 10-12-year-olds (n=19). The females (n=10) had a mean score of 21.0 (SD=2.4) and the males (n=9) had a mean score of 20.2 (SD=2.4). The difference between males and females was not significant.

The RMET-CV scores in the North Hall Middle School study appear to be slightly higher than the mean of many of the reported results the exception being the Baron-Cohen et al. (2001b) study. The slight difference may be because the participants in the current study were in

a gifted and talented program and may be prone to score higher on most assessments; however, there was less than one standard deviation difference between the scores on this measure in this study and the scores in other studies.

In this study, the CM3 was used as the measure for critical thinking. This measure consists of five separate independent subscales, and the results from the pretests were as follows: Mental Focus (M=30, SD=6.81), Creative Problem Solving (M=31.67, SD=9.22), Learning Orientation (M=32.78, SD=8.56), Cognitive Integrity (M=33.06, SD=7.77), and Scholarly Rigor (M=27.44, SD=7.44). Though there are no published norms for this measure, the results from this study can be compared to the results from the study listed in the CM3 manual, which are as follows: Mental Focus (M = 26.2, SD = 6.3), Creative Problem Solving (M = 28.2, SD = 7.3), Learning Orientation (M = 32.0, SD = 7.9), Cognitive Integrity (M = 25.5, SD = 7.6), Scholarly Rigor (M = 27.5, SD = 6.4)

The current sample exhibited slightly higher scores on each of the subscales than did the comparison group, except Scholarly Rigor which fell slightly below the score of the comparison group. However, only Cognitive Integrity was greater than one standard deviation above the mean from the study listed in the CM3 manual. The study listed in the manual stated that the subscale of Cognitive Integrity had a mean of 25.5 and a standard deviation of 7.6, meaning that one standard deviation above the mean would be 33.1. In the current study, the mean Cognitive Integrity subscale score of 33.66 was slightly more than one standard deviation higher than the study cited in the CM3 manual. It is important to note, however, that the current study found a standard deviation for the subscale of Cognitive Integrity of 7.76. This indicates that one standard deviation below the mean for the current study is a score of 25.9. While this score is slightly higher than the mean reported in the study cited in the CM3 manual, there is overlap in

the distributions of the two studies, which should be considered when interpreting the results.

For each scale, participants were classified as being in Strongly Negative (scores of 0-9), Somewhat Negative (10-19), Ambivalent (20-30), Somewhat Positive (30-40), or Strongly Positive (41-50) at both pretest and posttest. On the Mental Focus scale, eight students moved to a more positive classification while eight moved to a more negative classification from pretest to posttest and two experienced no changes. On the Learning Orientation scale, seven students moved to a more positive classification while ten moved to a more negative classification from pretest to posttest, and one student experienced no change. On the Creative Problem-Solving scale, seven students moved to a more positive classification while eight moved to a more negative classification from pretest to posttest and three students experienced no change. On the Cognitive Integrity scale, nine students moved to a more positive classification while eight moved to a more negative classification from pretest to posttest and one student experienced no change. On the Scholarly Rigor scale, ten students moved to a more positive classification while six moved to a more negative classification from pretest to posttest and two students experienced no change (see Table 2).

Hypothesis Tests

To test the hypothesis that middle school students who participated in an intervention that included a series of psychology-based social and emotional learning (SEL) activities would demonstrate an increase in empathy from pretest to posttest, a paired-samples t-test was run. The results were not significant ($t_{(17)} = .107$, $p = .92$). On average, the amount of change from pretest (M=19.83, SD=4.14) to posttest (M=19.94, SD=5.41) in empathy was not significant (Mdiff =.11, SD=4.40) Results did not support the hypothesis.

Table 2

Number of Participants in each category

	Strongly Negative 0-9	*Somewhat Negative 10-19*	*Ambivalent 20-30*	*Somewhat Positive 31-40*	*Strongly Positive 41-50*
Mental Focus	Pretest: 0 Posttest: 1	Pretest: 0 Posttest: 2	Pretest: 10 Posttest: 7	Pretest: 7 Posttest: 4	Pretest: 1 Posttest: 4
Learning Orientation	Pretest: 0 Posttest: 0	Pretest: 1 Posttest: 2	Pretest: 5 Posttest: 7	Pretest: 8 Posttest: 7	Pretest: 4 Posttest: 2
Creative Problem Solving	Pretest: 0 Posttest: 0	Pretest: 1 Posttest: 2	Pretest: 6 Posttest: 9	Pretest: 8 Posttest: 4	Pretest: 3 Posttest: 3
Cognitive Integrity	Pretest: 0 Posttest: 0	Pretest: 1 Posttest: 0	Pretest: 5 Posttest: 8	Pretest: 11 Posttest: 7	Pretest: 1 Posttest: 3
Scholarly Rigor	Pretest: 0 Posttest: 0	Pretest: 1 Posttest: 0	Pretest: 12 Posttest: 9	Pretest: 3 Posttest: 7	Pretest: 2 Posttest: 2

To test the hypothesis that middle school students who participated in an intervention that consisted of a series of psychology-based SEL activities would experience an increase in performance on each of the five critical thinking scales, five separate paired samples t-tests were run on the subscales on the CM3 (Mental Focus, Creative Problem Solving, Learning Orientation, Cognitive Integrity, and Scholarly Rigor). The only significant finding was on the Scholarly Rigor scale ($t_{(17)} = 2.29$, $p<.05$) indicating that scores increased significantly from pretest (M=27.44, SD=7.44) to posttest (M=29.72, SD=6.38). None of the other results were significant (See Table 3).

To test the hypothesis that there would be a correlation between the change in the levels of empathy and the change in each of the five critical thinking scales after the middle school students participated in the SEL intervention program, five separate correlation analyses were run. None of the correlations were significant (See Table 4).

Exploratory Analysis

To better understand the results of the current study's hypotheses, additional analyses were run. In the first of these analyses, the researchers were interested in exploring the relationship between scores on the empathy measure and scores on each of the critical thinking subscales at the time of pretest. Because the prefrontal cortex is involved in the use of empathy and critical thinking (Hawk et al., 2013; Georgi et al., 2014), a relationship between empathy and critical thinking could be a possibility.

A bivariate correlation was run to examine the relationship between pretest scores on the empathy measure and pretest scores for each of the critical thinking subscales. No significant relationships were found between the pretest scores on the empathy measure and the pretest

Table 3

Results of Hypothesis Tests, including Pretest and Posttest scores, T-Tests Comparing the Two, and the Amount of Change from Pretest to Posttest

	Pretest Scores	Posttest Scores	T-Test	Change Scores
Mental Focus	(M=30.0, SD=6.81)	(M=29.56, SD=10.28)	($t_{(17)}$ = -.352)	(M=-.44, SD=5.36)
Creative Problem Solving	(M=31.67, SD=9.22)	(M=30.22, SD=10.04)	($t_{(17)}$ = -.840)	(M=1.11, SD=4.40)
Learning Orientation	(M=32.78, SD=8.56)	(M=30.39, SD=9.36)	($t_{(17)}$ = -1.423)	(M=-2.39, SD=7.12)
Cognitive Integrity	(M=33.06, SD=7.77)	(M=32.94, SD=6.73)	($t_{(17)}$ = -.079)	(M=-.11, SD=5.99)
Scholarly Rigor	(M=27.44, SD=7.44)	(M=29.72, SD=6.38)	($t_{(17)}$ = 2.249) *	(M=2.28, SD=4.21)

** means p<.05*

Table 4

Correlations between Changes in Empathy and Changes in Critical Thinking

	Mental Focus	*Creative Problem Solving*	*Cognitive Integrity*	*Learning Orientation*	*Scholarly Rigor*
Empathy	(r =.192)	(r = .077)	(r = .363)	(r = -.440)	(r = .157)

** means p<.05*

scores on the critical thinking subscales (See Table 5).

Researchers were also interested in exploring how the results were affected by the scores of participants who scores were extreme outliers. For the RMET-CV there was one extreme outlier who performed 9 points worse on the posttest than the pretest. A paired-samples t-test was run to determine whether there would be a significant increase in empathy over the seven-week course of the intervention when the scores of one individual outlier were excluded. The results were not significant ($t_{(16)}$ =.89, p=.39). On the critical thinking subscales, there were three extreme outliers that scored at least 14 points worse on the posttest than the pretest on at least one of the critical thinking scales. Five paired samples t-tests were run to compare the change in scores on the critical thinking subscales, with the three participant's extreme scores excluded. The only significant change in scores from pretest to posttest was on the Scholarly Rigor subscale ($t_{(14)}$ = 3.53, p<.01), which went from p<.05 to p<.01 level of significance. All other analyses remained non-significant (See Table 6).

Because differences related to gender have been noted in previous research (Batanova & Loukas, 2012; Castillo et al., 2013), an independent samples t-test was run to compare the change in scores on the empathy measure from pretest to posttest for females compared to males. The mean for the change scores for males on the RMET was lower (M=0.00, SD=5.10)

The change for males on the RMET was lower (M=.00, SD=5.10) than for females (M=1.80, SD=2.90). However, the results were not significant. ($t_{(16)}$ = -.95, p=.36).

Also, independent samples t-tests were run to compare the scores for females compared to males for the five critical thinking subscales. None of the results were significant. Equal variances not assumed for learning orientation and cognitive integrity (See Table7).

Table 5

Correlations between Pretest Empathy and Critical Thinking Scores

	Mental Focus Pretest	*Creative Problem Solving Pretest*	*Learning Orientation Pretest*	*Cognitive Integrity Pretest*	*Scholarly Rigor Pretest*
RMET-CV Pretest	(r =.08)	(r = -.01)	(r =.24)	(r =.06)	(r =.00)

** means p<.05*

Table 6

T-tests excluding outlier participants

RMET-CV	*Mental Focus*	*Creative Problem Solving*	*Learning Orientation*	*Cognitive Integrity*	*Scholarly Rigor*
($t_{(16)}$= .89)	($t_{(14)}$ =.18)	($t_{(14)}$ = .87)	($t_{(14)}$= -.92)	($t_{(14)}$ = 1.80)	($t_{(14)}$ = 3.53)**

*** means p<.01*

Table 7

T-tests comparing change scores of females to males

RMET-CV	*Mental Focus*	*Creative Problem Solving*	*Learning Orientation*	*Cognitive Integrity*	*Scholarly Rigor*
($t_{(16)} = -.95$)	($t_{(16)} = -1.4$)	($t_{(16)} = -1.67$)	($t_{(7.72)} = -.34$)	($t_{(8.78)} = -1.11$)	($t_{(16)} = -.81$)

** means p<.05*

Along those same lines, to gauge whether middle school females had a greater level of empathy and critical thinking at baseline than did middle school males, several independent samples t-tests were run. Females students did better on the empathy pretest (M=21.00, SD=2.45) than male students (M=18.38, SD=5.45). However, the results were not significant. Also, the results on the critical thinking scales were not significant (See Table 8).

Because 72% of participants had experience with the intervention the previous year, researchers ran independent samples t-tests on empathy and the five critical thinking scales comparing the pretest scores for those with previous experience with the intervention to those without prior experience. Significant differences were found on the subscales of Creative Problem Solving ($t_{(16)} = 2.16$, $p<05$) and Cognitive Integrity ($t_{(16)} =2.73$) so that the participants who had prior experience with the intervention scored significantly higher on the pretests than did the participants without prior experience. On the Scholarly Rigor subscale Levine's Test was significant so equal variances are not assumed ($p<.05$) (See Table 9).

To explore whether having previous experience with the intervention had an impact on the change in empathy and critical thinking scores after the intervention an independent samples t-test was run. The results were not significant. Equal variances were not assumed for scholarly rigor (See Table 10).

Table 8

T-tests comparing pretest scores by gender

Empathy	*Mental Focus*	*Creative Problem Solving*	*Learning Orientation*	*Cognitive Integrity*	*Scholarly Rigor*
($t_{(16)}$ =-1.37)	($t_{(16)}$= -.14)	($t_{(16)}$= 1.07)	($t_{(16)}$= .37)	($t_{(16)}$= -.26)	($t_{(16)}$= 1.12)

** means p<.05*

Table 9

T-tests comparing participants by experience with the intervention to scores on the pretests

	RMET-CV	Mental Focus	Creative Problem Solving	Learning Orientation	Cognitive Integrity	Scholarly Rigor
T-Test	($t_{(16)}$ = -1.27)	($t_{(16)}$= -1.81)	($t_{(16)}$= 2.16)*	($t_{(15.37)}$= .82)	($t_{(16)}$= 2.73)*	($t_{(16)}$= .71)
Change Scores	(M= -2.72, SE=2.14)	(M= 6.09, SE=3.36)	(M= 9.51, SE=4.40)	(M= 2.74, SE=3.33)	(M= 9.50, SE= 3.48)	(M=2.83, SE=3.97)

** means p<.05*

Table 10

T-tests comparing participants by experience with the intervention to the change in scores

	RMET-CV	Mental Focus	Creative Problem Solving	Learning Orientation	Cognitive Integrity	Scholarly Rigor
T-Test	($t_{(16)}$ = .65)	($t_{(16)}$ = .56)	($t_{(16)}$ = -.88)	($t_{(16)}$= -.61)	($t_{(16)}$=-1.21)	($t_{(13.25)}$=-1.05)
Change Scores	(M= 1.38, SE=2.14)	(M= 1.6, SE=2.88)	(M= -3.38 SE=3.86)	(M= -3.15, SE=5.16)	(M= -3.75, SE= 3.11)	(M=1.83, SE=1.74)

** means p<.05*

To understand whether the above average level of ASD among the E2 population (20%) had an impact on the findings of the study the, results of the RMET-CV were used to exclude two subjects. According to the research individuals with ASD scored significantly lower than individuals without ASD on the RMET-CV (Baron-Cohen et al., 2001b; Demurie et al., 2011; Müller and Gmünder, 2014). Among the participants in the study, there were two subjects that performed over one standard deviation below the mean scores of typical students on the RMET-CV pretest. Demurie et al. (2011) found that typical students age 11-17 had a mean score of 19.17 (SD=2.55). Müller and Gmünder (2014) found that typical students (age 13-15) had a mean score of 17.8 (SD=3.5). Baron-Cohen, et al (2001b) found that typical students (age 10-12) had a mean score for males of 20.2 (SD =2.4) and females of 21.0 (SD = 2.4). Comparing the North Hall Middle School students to the typical students in each of these studies, in each case only two subjects fell over one standard deviation below the mean. Those two students were excluded and exploratory paired samples t-tests were run examining the change in performance on empathy ($t=.34_{(15)}$, $p=.74$). Additional paired samples t-tests were run with the same two students excluded for each of the critical thinking subscales from pretest to posttest. Scholarly rigor was still the only significant critical thinking scale (See Table 11).

Next, a correlation was run to examine the relationship between the pretest RMET-CV scores and the pretest critical thinking measure scores, while excluding those participants whose scores fellow below one standard deviation below the mean scores of typical students on the RMET-CV pretest. The results were not significant (See Table 12).

Table 11

Pretest and posttest scores excluding participants whose scores fell one standard deviation below what is typical, T-tests comparing the two, and the amount of change from pretest to posttest.

	Pretest Scores	Posttest Scores	T-Test	Change Scores
Mental Focus	(M= 30.25, SD= 7.20)	(M= 30.19, SD= 10.77)	($t_{(15)}$ = -.05)	(M= -.06, SD= 5.58)
Creative Problem Solving	(M= 31.69, SD= 9.60)	(M= 30.56, SD= 10.60)	($t_{(15)}$ = -.59)	(M= -1.13, SD= 7.62)
Learning Orientation	(M= 33.63, SD= 8.34)	(M= 30.88, SD= 9.83)	($t_{(15)}$ = -1.52)	(M= -2.75, SD= 7.23)
Cognitive Integrity	(M= 33.00, SD= 7.66)	(M= 33.50, SD= 6.95)	($t_{(15)}$ = .39)	(M= .50, SD= 5.13)
Scholarly Rigor	(M= 27.38, SD= 7.84)	(M= 29.56, SD= 6.73)	($t_{(15)}$ = 2.14) *	(M= 2.19, SD= 4.09)

** means p<.05*

Table 12

Correlations between pretest empathy (RMET-CV) and pretest critical thinking excluding those participants whose scores fell below one standard deviation of what is typical on the RMET-CV.

	Mental Focus Pretest	*Creative Problem Solving Pretest*	*Learning Orientation Pretest*	*Cognitive Integrity Pretest*	*Scholarly Rigor Pretest*
RMET-CV Pretest	(r = -.05)	(r = -.15)	(r =.14)	(r = -.03)	(r = -.02)

** means p<.05*

To better understand the results of the empathy measure, a simple linear regression was run to see if the pretest scores on the empathy measure could predict the change in scores from pretest to posttest. This was done because it would be possible that a lower score on the RMET-CV may affect the ability of a student to make gains in empathy. For example, a student on the autism spectrum may have significantly lower scores at pretest on the RMET as the research suggests. This may have an impact on their ability to make significant progress in empathy within seven weeks. However, we found that in this study it did not appear to be the case. The results were not significant ($F(1,16) = 1.25$, $p = .28$), ($R2 = .07$).

A final exploratory analysis was run to determine whether the results were significantly different between subject group one (pretest on 10-29-15) and subject group two (pretest on 1-26-16). The second group that started in January completed the seven-week intervention very close to the time they were taking the GA Milestones (end of the year exams). The students could have been more stressed during the posttest than the first group was during their posttest. Independent samples t-tests were run. The results were not significant (Table 13).

Table 13

T-test comparing differences in scores for Groups 1 and Groups 2

RMET-CV	Mental Focus	Creative Problem Solving	Learning Orientation	Cognitive Integrity	Scholarly Rigor
(t (16) =.46)	(t (16) =.83)	(t (16) =-.42)	(t (16) =-.89)	(t (16) =.79)	(t (16)=-1.63)

** means p<.05*

Chapter Five

Discussion

Past research has indicated that students benefit from instruction on empathy and critical thinking. White (2010) found that direct instruction of critical thinking led to increased problem-solving abilities and more effective communication, and empathy instruction has been shown to lead to better perspective-taking abilities, improved communication skills, and fewer instances of bullying (Hawk et al., 2013; Şahin, 2012). Though there are studies that have examined the benefits of instruction of empathy and critical thinking, few studies have examined the benefits of instruction of both constructs together. Also, few studies have examined the efficacy of such interventions when conducted with adolescents, and few have examined the relationship between these two constructs during the period of adolescent development. This study aimed to address this gap in the literature by examining the efficacy of an intervention designed to increase the critical thinking and empathy levels of middle school students.

In the current study, it was hypothesized that there would be an improvement from pretest to posttest in levels of empathy and in levels of critical thinking for those who participated in the SEL intervention. In addition, it was hypothesized that there would be a relationship between the amount of improvement in empathy and the amount of improvement in critical thinking. Previous research has supported the efficacy of SEL activities in increasing empathy levels (Schonert-Reichl et al., 2015; Yeager & Walton, 2011) as well as in increasing critical thinking. Because the prefrontal context is involved in the use of empathy and critical thinking, it was hypothesized that there would be a correlation between the changes in empathy and the changes in critical thinking.

The observations made in the current study suggest that there was no significant

improvement in empathy or most of the components for critical thinking. The only significant improvement found was in scholarly rigor, which may indicate that the participants were more engaged and attempted to gain a greater understanding of the material being presented post-intervention.

It is possible that the results did not suggest that there was an increase in empathy levels due to the measure used. Additionally, perhaps the intervention, which contained many social and emotional learning activities geared towards different topics, did not directly focus on empathy development enough to promote an increase in the students' initial levels of empathy. The interventions were taught using interactive games, and perhaps the purpose behind the exercises was not explained clearly enough. Each week, multiple lessons were taught, so the students may not have understood the purpose of the individual activities. It's possible the activities conducted in the classrooms were not interrelated enough for students to derive the few key components sufficient to result in significant growth in these targeted areas. Additionally, the schedule of the interventions may have affected the degree of benefit the participants derived from them. Though the interventions took place approximately three times per week and were not held on consecutive days, but rather on Tuesdays, Thursdays, and Fridays. Additionally, the scheduling of the interventions was subject to change based on the schedule of the school; the intervention might not have been held if the students were expected to participate in a school activity, such as a field trip or testing. This irregular schedule could have potentially contributed to the lack of significance derived from the interventions. The learning that the students gained as a result of the intervention might have been greater if this learning was reinforced at more regular intervals. Another factor is that two of the three days each week the researchers were only present in the classrooms for approximately 30 minutes, and on Fridays, they were in the

classrooms for approximately one hour. Perhaps, there was too little time spent on the interventions to have seen any significant increase in scores from pretest to posttest.

Additionally, the majority of the participants (72%, n=13) had prior experience with the measures and interventions the previous year. This prior experience could have affected the students' responses to the intervention; it is possible the students received the maximum benefit they were going to derive from the intervention. This did not appear to be the case for empathy on the RMET-CV in the exploratory analysis. On the critical thinking scales, the students that had previous experience with the intervention did slightly better on all the scales. However, there was a significant difference on Creative Problem Solving and Cognitive Integrity for the pretest scores. This did not carry over into the change scores.

Additionally, the students regularly mentioned that their stress levels were high and that they had a lot of school work to complete. The students may have been unable to focus due to feelings of being overwhelmed by the demands of their courses. The pretests were administered at times during the school year when the academic demands on the participants were lower. However, the posttests were administered during times of higher academic demands, around the times of midterms or finals for the both the fall and spring groups. For the second group, the posttest was around the date of the GA Milestones and their final exams. For this reason, the performance on the posttest measures could have been impacted. The participants may not have taken these measures as seriously as they had taken the pretest measures, knowing the scores on these measures would not impact their school grades. Stress due to the upcoming exams may have impacted the participants' ability or desire to focus on the posttests. An exploratory analysis compared the change scores from pretest to posttest for both groups and found no significant difference between the two groups. However, it could be that both groups were in a

similar state of increased stress by posttest and therefore a difference may not be present. It would be valuable if, in future studies, if the schedule is arranged in a way that the workloads for the participants be similar for both the pretest and posttest. The demands of the students' classes meant there were several instances where some students were not able to be present due to other responsibilities, such as involvement in sports or clubs. Additionally, some students may not have been present for every intervention because of school absences. This irregular attendance pattern meant that there were several days in which the interventions were carried out without all the students being present, which likely influenced the effectiveness of the interventions. Further research should be conducted with all the participants present at all the activities to ensure maximum benefit from the intervention. A record of participant attendance should to examine how attendance affected performance on the posttest measures.

Despite these problems, there was a significant increase found from pretest to posttest on the subscale of Scholarly Rigor. Scholarly Rigor is a measure of value a person places on being able to understand and manipulate abstract concepts and information (Giancarlo & Facione, 2006). This subscale was, at the time of pretest, the scale on which participants scored the lowest, and thus had the most room for improvement, and represented an area in which the participants could gain the most benefit from the intervention. However, there is a possibility that some of the increase in scores found in this area was influenced by the demands that the students' classes placed upon them. Because coursework often increases as the semester progresses, the participants likely had fewer academic responsibilities at the time of pretest than at the time of posttest. The demands placed on the participants by their classes could have influenced how the students valued being able to manipulate information, and thus contributed to the increase found on the subscale of Scholarly Rigor.

Another reason that there may have been a lack of improvement seen from pretest to posttest scores, particularly in the area of critical thinking, is the lack of explicit instruction. Studies have shown that implicit instruction does not increase the level of critical thinking, but rather individuals must be explicitly taught critical thinking skills to further advance in that area. In a study consisting of 227 students ranging in age from 20 to 21-years-old with 77 participants in the experimental group and the remaining 150 participants in the control group found that all the participants scored the same on critical thinking at the time of the pretest. However, after the experimental group completed a three-month active-learning program designed to teach and increase the motivation to use critical thinking skills, their posttest results showed a significantly greater improvement in critical thinking ability when compared to those in the control group (Rimiene, 2002). Similarly, in another study consisting of 52 participants with 44% (n=23) in the experimental group and 56% (n=29) in the control group, it was found that after the experimental group received approximately an hour and a half of explicit CT instruction and then integrated the model into class assignments, they achieved a significantly greater increase from pretest to posttest scores in comparison to the control group which received traditional instruction on course materials (Reed, 1998). A meta-analysis conducted by Abrami et al. (2015) examined primary empirical studies using search terms related to critical thinking and teaching critical thinking; 117 studies met the inclusion criteria resulting in 20,698 total participants. The meta-analysis demonstrated a relationship between the way that CT is taught and improved CT skills. The groups where CT was explicitly taught saw significant improvement versus the immersion implementation group where CT was not explicitly taught which resulted in small, non-significant differences. Additionally, in studies conducted by Kettler (2014) and Howard et al. (2015) found that implicit critical thinking instruction did not

increase critical thinking ability from pretests to posttests.

The lack of explicit critical thinking instruction in this intervention could explain why the results on the critical thinking scales were not more significant. Rimiene (2002), Reed (1998), Abrami et al. (2015), Kettler (2014) and Howard et al. (2015) all generated results within their research that suggests the important of explicit critical thinking instruction. This study did not contain a curriculum or activities specifically geared towards teaching critical thinking. Rather, the researchers were hoping the participants would think critically about the topics being presented as a result of discussion and processing at the end of the activities. An example of this is the Fatal Vision goggles activity. This activity allowed the students to perform a series of tasks with and without the goggles to simulate the difference between being intoxicated or sober. This activity was followed by a discussion about the difficulties faced in completing the tasks with the goggles on and what would it be like if they were to be driving or completing everyday tasks with the same level of inhibitions due to intoxication. After the activity had been completed by each of the students, the researchers presented the students with some follow-up questions regarding their experience and their thoughts about what it would be like to do a variety of things while intoxicated, and what the consequences could be. The idea was that these questions would facilitate critical thinking. However, the researchers were not explicitly teaching critical thinking skills, to do so might involve teaching the students how to formulate their questions about the topic being presented. Rather, the researchers presented a few questions with the hopes that the students would engage in thinking critically on their own before giving a response. In addition to critical thinking not being explicitly taught during the seven-week intervention, the only activities conducted to stimulate critical thinking were the fatal vision goggle activity, the cultural simulation activity, and the simulation of aging activity. Though the

study by Klein et al., (1997) demonstrated that critical thinking skills are not domain specific, and they can be transferred and applied across domains, the other 10 activities within the intervention were not geared towards critical thinking and were geared towards another construct. Therefore, the observations made in this study that there was almost no significant increase within the area of critical thinking is not surprising. Perhaps future research could explicitly teach critical thinking skills first and then incorporate SEL activities to allow the participants to practice their newly acquired skills.

On the other hand, empathy development was specifically addressed by six or possibly seven out of the eleven activities that were a part of the intervention. However, these activities were intermixed amongst other activities with several sessions focusing on decreasing test anxiety. Integrating other concepts may have diluted the impact of the intervention regarding increasing level of empathy. The choice of the measure was a factor that may have had a major impact on the lack of significance seen between pretest and posttest scores. The Reading the Mind in the Eyes (RMET) had potential problems for use in this study that may have influenced the results. First, it was questionable whether the RMET accurately captured the construct of empathy. It appears that it measured emotion recognition which is only one aspect of emotional empathy. Only one of the activities on the movement day directly targeted emotion recognition. It could be that progress was made in other aspects of empathy that were not measured by the RMET-CV. Also, there were most likely students with autism spectrum disorder in the sample, and they may have done worse on the RMET-CV than they would on other empathy measures that did not depend on the student's' emotion recognition abilities. Ideally, it would have been good to be able to know which students were on the autism spectrum. However, the IRB process did not allow for this type of question. It was planned that the Interpersonal Reactivity Index

(IRI) would be added to future trials as a second empathy measure; however, the second year of the study was canceled.

An additional possible reason for the lack of significance was that some of the students had also experienced many of these activities the year before. Exploratory analysis showed that there were significant differences were found on the subscales of Creative Problem Solving and Cognitive Integrity, with the participants who had prior experience with the intervention scoring significantly higher on the pretests than did the participants without prior experience. This difference indicates that there was a relationship between prior exposure to the intervention and scores for these subscales. This is interesting and is another reason to pursue future research, maybe even including a follow-up study one year later. Because the majority of participants 72% (n=13) had prior experience with the intervention, the results of the hypothesis tests are were not as representative of the effectiveness of the intervention as the results from data gathered from a group of individuals without this prior experience would be.

Perhaps, if there had been greater inclusion of activities that explicitly promoted critical thinking development, this may have increased the amount of empathy development the students experienced. Had the participants been taught to think critically, because the skills transfer to other domains, perhaps the students would have been able to experience more empathy or have significantly increased their test scores from pretest to posttest.

These results may indicate a variety of things such as that the intervention does not lead to an improvement in empathy or critical thinking. However, there are other explanations and possible causes as to why the results did not support the hypotheses.

The sample size used in this study was rather small (n=18), and thus could have been too small of a sample to allow for enough statistical power to detect changes in scores from pretest to

posttest. A larger sample size in further studies can allow for better detection of statistical change, as well as allow for greater generalizability.

Though there is some research to support the idea that critical thinking and empathy are somewhat related to one another, there is not much research demonstrating such a correlation. Research has shown that critical thinking is a part of cognitive empathy though there is little research on this relationship at this point. This would be another area for future research.

The lack of support for the third hypothesis that there would be a significant correlation between increases in empathy and the increases in critical thinking should be examined further. There was reason to believe that there would have been a correlation between the scores on these two measures, as Jackson et al. (2006) pointed out that there was a neurological component in both empathy and the perspective taking form of empathy. Additionally, both empathy and critical thinking are regulated by the prefrontal cortex (Hawk et al. 2013; Taylor et al., 2013a). It was believed that, because of such connections between the two constructs, there would be a correlation between the change in critical thinking scores and the change in empathy scores. For this reason, it was believed that an intervention designed to increase both constructs would have potentially shaped the development of the prefrontal cortex, which is rapidly developing during the period of adolescence (Blakemore & Choudhury, 2006), and led to increases in both areas. However, this hypothesis was not supported by the results. One potential explanation as to why there was not a significant relationship found between the changes in scores on the empathy and critical thinking measure is that there were no significant changes found on the empathy measure and significance on only one critical thinking measure so that the data would be less likely to indicate a relationship between non-significant changes on these measures. Another possible explanation is that both empathy and critical thinking develop in a nonlinear fashion so that there

are fluctuations in these two areas over the course of normative development (Hawk et al., 2013; Taylor et al., 2013a). Exploratory analyses were conducted to assess if a correlation between pretest levels of critical thinking and empathy, so that it could be determined if there was a relationship between these two constructs before the intervention.

Exploratory analyses suggest that there was no significant relationship between the pretest scores on the empathy measure and the pretest scores on the critical thinking subscales; however, research has shown that there is a neurological connection between critical thinking and the perspective-taking aspect of empathy (Jackson et al., 2006). However, there are areas of the brain other than the prefrontal cortex, such as the amygdala and the anterior cingulate cortex, for example, that are utilized in the empathy process (Decety, 2010). Additionally, the myelination process does not begin in the frontal cortex until adolescence (Blakemore & Choudhury, 2006). It is possible that areas of the brain involved in the empathy process other than the prefrontal cortex, are more developed than the prefrontal cortex, which could potentially cause there to be no significant correlation found between these two constructs at the time of pretest. There are a variety of other possible reasons why that correlation may not have been demonstrated in this study, such as poor construct validity, as the empathy measure may not have been an accurate gauge of empathetic ability and more a measure of emotional versus cognitive empathy. Current research suggests that the RMET-CV measures emotion recognition (an aspect of emotional empathy) and not cognitive empathy (Oakley et al., 2016), the results may have been different if the IRI had been used which also measures cognitive empathy. A correlation may have been found between cognitive empathy and critical thinking. Additionally, two participants' scores were consistently outliers compared to other participants in the sample. Once the data was examined without the scores of these participants, there was no difference in

significance found. This lack of change in significance indicates that, though the scores of these participants were outliers, these scores did not greatly impact the results of the analyses. Possible explanations for the lack of significance once these scores were removed include an ineffective intervention or minimal amount of intervention time with a greater amount of time required to significantly increase the critical thinking and empathic abilities of an individual.

Additionally, an independent samples t-test was run to compare the change in scores from pretest to posttest of females to males on each of the two measures, and the results were not significant. That there were no significant differences between genders is contrary to the findings of other researchers, such as Litvak-Miller et al. (1997), who found that females scored higher than males on several empathy scales, such as an emotional concern scale, a personal distress scale, and a perspective-taking scale. Additionally, Castillo et al. (2013) found that female participants had higher levels of empathy than did male participants at the time of pretest, which led to a ceiling effect. Castillo et al. (2013) also observed that, while there was a significant increase in empathic concern among male participants, males showed no difference in perspective-taking. The lack of significance could be due to there being no significant differences between male and female participants regarding either empathy or critical thinking. However, the lack of significant differences between genders may be due to such a small sample size of each gender. It is possible that the number of participants did not allow for enough power to detect any changes due to the intervention. If more participants were in the sample, it is possible that there would have been an observable difference between the two genders. Also, the lack of significance could relate to the empathy measure. Baron-Cohen et al. (2001b) did not find a significant difference between males and females using the RMET-CV.

A simple linear regression was run to see to what extent that the pretest scores on the

empathy measure predict the change in scores on the empathy measure from pretest to posttest. It was found that the scores on the empathy measure at the time of pretest did not significantly predict the change in scores from pretest to posttest.

Strengths

Despite the lack of significant findings in empathy development and most of the critical thinking scales, there are several strengths to the current study. First, this study is unique in that it begins to address a gap in the literature because there are very few studies with middle schoolers. The researchers were unable to locate any studies that examine both empathy and critical thinking together, particularly in a middle school population as this population is so infrequently studied.

Also, the significant finding on scholarly rigor is interesting in that it points the way to the potential value of future research. There may be more to discover when the recommendations are incorporated into a future experiment.

Limitations

The internal validity of the study was threatened by several factors, such as the lack of a control group, limited intervention time, some students having prior experience with the intervention, and a small sample size. The current study used only data collected from a group of participants who experienced the intervention, and did not utilize data collected from a control group, and thus had no data to use as a means of comparison. This lack of a comparison group means that there is a threat to the internal validity as, without a control group, there is no way to determine whether the significant increase in “scholarly rigor” was due to the seven-week intervention, or due to an additional seven weeks of academic studies or maturation. The

inclusion of a control group would have allowed researchers to have data to compare the results to, and thus be more confident about the cause of the increase in scores on the Scholarly Rigor subscale.

Internal validity may have also been threatened by the relatively short seven-week period in which the intervention took place. Two hours a week for seven weeks may not have been enough time for there to be significant changes. There is a possibility that significant differences would have been found between the pretest and posttest scores on one or both measures if the intervention had been carried out over a longer period. The lack of significant results could have been due to the intervention being carried out over too short of time, and not that the intervention was failing to target empathy and critical thinking development. Further research would benefit from conducting the intervention over a longer interval, with more frequent periods of instruction, so that the intervention is more likely to bring about significant results if the intervention does successfully target these constructs.

Also, critical thinking and empathy could have been targeted more directly, as only six of the 21 days were spent focused on empathy, and only four of the 21 days had a specific critical thinking component. Had the intervention been designed to target more specifically these constructs greater significance may have been found. If the intervention had been created to target critical thinking explicitly rather than implicitly more significance could have been found. Among the social and emotional learning activities in the intervention that directly focused empathy and critical thinking, there were several days of activities where decreasing test anxiety was the focus of the day. During the days focused on stress reduction, neither empathy nor critical thinking was discussed. Another threat to internal validity is the previous experience that many of the participants had with the intervention. There is a possibility that significant

differences between pretest and posttest for empathy and more critical thinking scales may have been found if all the participants had no prior experience with the measures and intervention. This is a definite possibility given that the students with previous experience with the intervention performed significantly better on two of the critical thinking scales This history with components of the study affected the participants' performance on the pretests, and subsequently the posttests. Thus, the scores may not be an accurate representation of the participants' abilities before having been exposed to the intervention. Because the majority of the participants (n=14) had previous experience with the intervention and the measure, the pretest data for these individuals did not truly represent the attitudes and abilities of these participants before the intervention was conducted. Instead, for 14 participants, the pretest data for these individuals represented the attitudes and abilities after having already experienced the intervention the previous year, and thus was not accurate baseline data that could be used as a means of comparison. Only four participants in the current study had no previous exposure to the intervention or the measures. The data collected from the individuals in this sample was mainly from individuals who could not provide accurate baseline data because of this previous exposure to the intervention and measures, and this previous exposure should be considered when interpreting the results found in the current study.

Due to concerns regarding the external validity of the study, caution should be used when interpreting the above results and generalizing these findings to a larger population. The sample used in the study was relatively small (n=18) and was not representative of all middle school populations. All the participants were seventh-grade students attending a local middle school in rural Georgia. The participants were all enrolled in the gifted and talented program and were predominantly Caucasian (n=17), with only one student reporting his or her identity to be mixed

or other. During the selection process for E2 Academy, the students were assessed for many things including empathy. In addition, according to faculty, there were a few students who had a diagnosis of Autism Spectrum Disorder (ASD) among the E2 students. This may have had an impact on student performance on the empathy measure. Several studies found that individuals with ASD performed significantly poorer than a typically functioning population (Baron-Cohen, et al.,2001b; Demurie et al.,2011). This could have influenced the performance of some students on the empathy measure and the students with ASD may not have been able to make progress on emotion recognition as quickly as the neurotypical students. Ideally, it would have been better for external validity to have worked with a more diverse population. The researchers, because of the IRB were not able to collect data in which subjects had a diagnosis of ASD. However, the RMET-CV data was helpful in suggesting which individuals might be on the spectrum. After excluding the two individuals with extremely low pretest scores on the RMET-CV, the hypothesis tests were run again. There was still only significance on one critical thinking scale. It appeared that a possible ASD diagnosis might not have been as significant of a factor in the results as we expected.

According to the grounded theory of generalized causal inference (Shadish, Cook, & Campbell, 2002), causal generalizations can be made based on five principles: surface similarities, ruling out irrelevancies, making discriminations, interpolation and extrapolation and causal explanation. These principles can assist in the examination of external validity.

This study used a sample of gifted and talented students that was mostly racially homogenous. Based on the principle of surface similarities and Campbell's Principal of Proximal Similarity there can be generalizations made to other similar populations of mostly White, gifted and talented students.

Using the second principle of ruling out irrelevancies researchers can examine which variations in subjects, treatment methods, locations, and outcomes are irrelevant to a cause and effect relationship, or in the case of this study, a correlational relationship. The exploratory analyses examined some of the variation in subjects to discover which were relevant and which were irrelevant. The gender of the subjects was examined through independent samples t-tests to see if there was a difference between males and females both in baseline levels of empathy and critical thinking as well as the increase in these levels after the intervention. All the results were non-significant, which would make gender irrelevant in the case of this study. However, because of the small sample size and research (Batanova & Loukas, 2012; Castillo et al., 2013; Litvak-Miller et al., 1997) that contradicts the irrelevance of gender suggested in this study, the results should be viewed with a degree of skepticism. According to the exploratory analyses, it also appeared to be irrelevant whether a subject had previous experience with the intervention the year before. The small sample size should be considered when attempting to generalize any conclusions made about previous experience with the intervention.

The third principle of making discriminations is important in understanding the external validity of this study. Because the RMET may only have measured one aspect of empathy, there could be discriminant validity challenges to both construct and external validity. Conclusions maybe should only be made about one aspect of empathy, emotion recognition. In other words, what could be more accurately concluded is that emotion recognition did not increase from pretest to posttest after the intervention. Despite empathy being targeted by many of the interventions, emotion recognition was only targeted by one intervention on one day - the day with the empathy building movement activities. Among these activities was a mirroring exercise where the students mirrored each other's faces and body movements, then reflected on the

feelings their partner was expressing. This could explain why the ability to recognize emotion did not increase from pretest to posttest.

The fourth principle of generalized causal inference is interpolation-extrapolation. With the small sample size, it is difficult to extrapolate to a larger population. If any extrapolating is done, it should be to a population that shares characteristic of the sample, such as a mostly White, gifted and talented population. Ideally, this study could be considered a pilot study, pointing the way to future research instead of being used for extrapolation.

The last principle is a causal explanation which refers less obvious similarities between the sample and a population that might contribute to external validity and applications of the study. Once again, this study is too small to use this principle accurately.

Additionally, the construct validity should also be considered when interpreting the results of this study. A primary concern in this study regarding construct validity was the empathy measure because there has been some disagreement about what it measures. It has been used as an empathy measure in many studies (Baron-Cohen et al., 2001b; Shamay-Tsoory et al., 2009), though it was originally used as a measurement of theory of mind (Oakley et al., 2016) which is similar to cognitive empathy. However, Oakley et al. (2016) suggested through their research that it is more accurately a measurement of how someone is feeling, which is emotional empathy. Emotion recognition appears to be the task of the assessment which is an aspect of emotional or affective empathy, but may not necessarily cover emotional simulation (the other aspect of emotional empathy). It addition, Demurie et al. (2011) stated that it was a useful test to identify subtle impairments in social intelligence. Since there is not a clear consensus of what construct this assessment is measuring, it would be ideal for future research to address these concerns by adding an empathy measure such as the interpersonal reactivity index (IRI) with

subscales that measure the various aspects of empathy.

The unreliability of measures may be a threat to statistical conclusion validity in this study because of the mixed results of research on the reliability of the RMET-CV; Müller and Gmünder (2014) found that scores were negatively skewed and there was poor internal consistency ($\alpha = .53$, M=17.8, SD= 3.5).

Because the majority of the participants in this study had already been exposed to the intervention and the measures the previous year, it is possible that these students had benefitted from the intervention, and that subsequent experiences with the intervention are less likely to benefit these participants regarding critical thinking and empathy development. Because no pre-post data was collected the prior year, it is unclear how the participants with prior exposure benefitted from the intervention during their first exposure. For this reason, the researchers cannot be certain whether the intervention was successful at fostering the development of empathy and critical thinking, or if the intervention was successful, but that repeated experiences with the intervention did not provide the same benefits as the initial experience. While exploratory analysis comparing those with previous experience to those without experience with the intervention did not show any significant results, it should be noted that only four participants had no prior experience with the intervention. This small number of participants may have lowered the statistical power to detect changes in scores, and thus led to a greater chance of making a Type II error, or a false negative. Future research may benefit from using a more diverse group of participants, who lack prior experience with the intervention or measures.

Despite the threats to reliability and validity, this study was interesting in that there was significance in the change from the pretest to posttest on one of the critical thinking scales "scholarly rigor." Scholarly rigor is the habit of working hard to learn new material, especially

complex ideas and information (Insight Assessment, 2015). The implication of results of the study is that it can spark curiosity and interest in pursuing future research in this area. It raises new questions that can be explored. It suggests the potential value of future studies that measure the effectiveness of interventions in social and emotional learning, including empathy and critical thinking. This type of research could be valuable to the field because it may encourage schools to add in social and emotional learning as they are covering strictly academic subjects required by the Common Core standards ("Common Core State Standards," 2010) and the No Child Left Behind Act of 2001 ("The Elementary and Secondary Education Act," 2010).

Recommendations

Future research regarding empathy and critical thinking could benefit from a social and emotional learning intervention that is specifically created to enhance these constructs. The activity intervention including the collaboration between Brenau University and North Hall Middle school was already in place the year before the current study beginning. Because of this, instead of designing an intervention to target empathy and critical thinking specifically, the researchers looked at the existing social and emotional learning intervention and attempted to derive constructs from the activities. Though this research only addresses empathy and critical thinking, there was also a stress management component to the intervention with test anxiety being measured by another group of researchers. Future research would also benefit from the use of a larger more diverse sample of students, students without prior participation, and the use of a control group.

It is recommended that further research is conducted among the middle school population and specifically in the areas of empathy and critical thinking development, as there is a literature

gap in this area. Additional research could also be done in the elementary and high school populations, as both these areas are understudied as well. Alternative research designs may include interventions specifically focused on one construct such as empathy, critical thinking, or stress management, for a longer duration of time than was demonstrated in this study. Future studies may find it beneficial to use the interpersonal reactivity index (IRI) as a measure of empathy or combine it with the RMET, which may result in greater construct validity. Given that significance was found on one of the critical thinking scales, future research in this area may produce significant results.

There is a need for future research demonstrating the benefits of social and emotional learning interventions because it will encourage schools to include this SEL in the classroom. With academic performance standards being highly stressed in the current school climate, it is important to be able to demonstrate the value of social and emotional learning, especially in ways that it may be able to contribute to increasing critical thinking and levels of empathy.

Additional research that may further this cause would be studies that not only measure increasing levels of empathy and critical thinking as a result of a social and emotional learning intervention, but at the same time measure changes in prosocial behavior in the classroom, changes in aggressive behavior or bullying, and changes in academic performance.

References

Abrami, P. C., Bernard, M., Borokhovski, E., Waddington, D. I., Wade, C. A., & Persson, T. (2015). Strategies for teaching students to think critically: A meta-analysis. *Review of Educational Research*, *85*(2), 275–314. https://doi.org/10.3102/0034654314551063

Abrami, P. C., Bernard, R. M., Borokhovski, E., Wade, A., Surkes, M. A., Tamim, R., & Zhang, D. (2008). Instructional interventions affecting critical thinking skills and dispositions: A stage 1 meta-analysis. *Review of Educational Research, 78*, 1102-1134. https://doi.org/10.3102/0034654308326084

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders: DSM-5* (5th ed. ed.). Washington, D.C.: American Psychiatric Association.

Andari, E., Duhamel, J.R., Zalla, T., Herbrecht, E., Leboyer, M., & Sirigu, A. (2010). Promoting social behavior with oxytocin in high-functioning autism spectrum disorders. *Proceedings of the National Academy of Sciences*, *107*(9), 4389–4394. https://doi.org/10.1073/pnas.0910249107

Aoki, Y., Yahata, N., Watanabe, T., Takano, Y., Kawakubo, Y., Kuwabara, H., … Yamasue, H. (2014). Oxytocin improves behavioral and neural deficits in inferring others' social emotions in autism. *Brain*, *137*(11), 3073–3086. https://doi.org/10.1093/brain/awu231

Baldi, S., Warner-Griffin, C., & Tadler, C. (2015). *Education and certification qualifications of public middle grades teachers of selected subjects: Evidence from the 2011-12 schools and staffing survey.* NCES 2015-815. National Center for Education Statistics. Retrieved from http://eric.ed.gov/?id=ED557793

Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., & Plumb, I. (2001a). The "Reading the Mind in the Eyes" Test revised version: A study with normal adults, and adults with

Asperger syndrome or high functioning autism. *Journal of Child Psychology and Psychiatry,* 42, 241-252. https://doi.org/10.1017/s0021963001006643

Baron-Cohen, S. Wheelwright, V. Scahill, J. Lawson & Spong, A. (2001b). Are intuitive physics and intuitive psychology independent? A test with children with Asperger syndrome. *Journal of Developmental and Learning Disorders,* 5, 47-78. http://www.academia.edu/download/40527998/Are_intuitive_physics_and_intuitive_psyc20151130-16043-1yg584h.pdf

Batanova, M. D., & Loukas, A. (2012). What are the unique and interacting contributions of school and family factors to early adolescents' empathic concern and perspective taking? *Journal of Youth and Adolescence*, *41*(10), 1382–91. Retrieved from http://doi.org/http://dx.doi.org.ezproxy.brenau.edu/10.1007/s10964-012-9768-5

Beaudette, P. (2014, October 1). Georgia Milestones: Georgia's New Standardized Test [Government]. Retrieved February 17, 2017, from https://gosa.georgia.gov/georgia-milestones-georgia%E2%80%99s-new-standardized-test

Blakemore, S.J., & Choudhury, S. (2006). Development of the adolescent brain: Implications for executive function and social cognition. *Journal of Child Psychology and Psychiatry*, *47*(3-4), 296–312. https://doi.org/10.1111/j.1469-7610.2006.01611.x

Butean, I., Costescu, C., & Dobrean, A. (2014). Differences between empathic responses in children with autism spectrum disorder and typically developing children. *Journal of Evidence-Based Psychotherapies*, *14*(2), 197–209. Retrieved from https://ezproxy.brenau.edu:2040/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=98776727&site=eds-live

CASEL Impact. (2016). Retrieved October 15, 2016, from http://www.casel.org/social-and-

emotional-learning/impact/

Castillo, R., Salguero, J. M., Fernández-Berrocal, P., & Balluerka, N. (2013). Effects of an emotional intelligence intervention on aggression and empathy among adolescents. *Journal of Adolescence*, *36*(5), 883–892. https://doi.org/10.1016/j.adolescence.2013.07.001

Chaminade, T., Meltzoff, A. N., & Decety, J. (2002). Does the end justify the means? A PET exploration of the mechanisms involved in human imitation. *NeuroImage*, *15*(2), 318–328. https://doi.org/10.1006/nimg.2001.0981

Christensen, D. L. (2016). Prevalence and characteristics of autism spectrum disorder among children aged 8 years — Autism and developmental disabilities monitoring network, 11 Sites, United States, 2012. *MMWR. Surveillance Summaries*, *65*. https://doi.org/10.15585/mmwr.ss6503a1

Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects. (2010). Retrieved from http://www.corestandards.org/wp-content/uploads/ELA_Standards1.pdf

Consortium UChicago. (2012). Retrieved from https://.uchicago.edu /sites/default/files/publications/Noncognitive%20Report.df

Cohen, G. L., Garcia, J., Apfel, N., & Master, A. (2006). Reducing the racial achievement gap: A social-psychological intervention. *Science*, *313*(5791), 1307–1310. https://doi.org/10.1126/science.1128317

Cuff, B. M. P., Brown, S. J., Taylor, L., & Howat, D. J. (2016). Empathy: A review of the concept. *Emotion Review*, *8*(2), 144–153. https://doi.org/10.1177/1754073914558466

Davis, C. (1990). What is empathy, can it be taught? *Physical Therapy, 70*(11), 32-36.

http://dx.doi.org/10.7326/0003-4819-116-10-843

Decety, J. (2010). The neurodevelopment of empathy in humans. *Developmental Neuroscience*, *32*(4), 257–267. https://doi.org/10.1159/000317771

Decety, J. & Ickes, W. (2011). *The social neuroscience of empathy*. Cambridge, MA, US: MIT Press.

Definitions of Giftedness | National Association for Gifted Children. (n.d.). Retrieved June 11, 2017, from https://www.nagc.org/resources-publications/resources/definitions-giftedness

Delaveau, P., Arzounian, D., Rotgé, J.-Y., Nadel, J., & Fossati, P. (2015). Does imitation act as an oxytocin nebulizer in autism spectrum disorder? *Brain*, *138*(7), e360–e360. https://doi.org/10.1093/brain/awv060

Demurie, E., De Corel, M., & Roeyers, H. (2011). Accuracy in adolescents with autism spectrum disorders and adolescents with attention-deficit/hyperactivity disorder. *Research in Autism Spectrum Disorders*, 5, 126–134. https://doi.org/10.1016/j.rasd.2010.03.002

Development Process | Common Core State Standards Initiative. (n.d.). Retrieved June 28, 2017, from http://www.corestandards.org/about-the-standards/development-process/

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development*, *82*(1), 405–432. https://doi.org/10.1111/j.1467-8624.2010.01564.x

Dwyer, C., Hogan, M. J., & Stewart, I. (2011). The promotion of critical thinking skills through argument mapping. In *Critical Thinking* (1st ed.). Nova Science Publishers. Retrieved from https://www.researchgate.net/publication/259286333_The_promotion_of_critical_thinking_skills_through_argument_mapping

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. https://doi.org/10.1016/j.tsc.2013.12.004

ELA-Georgia-Standards-of-Excellence-K-12-with-Glossary.docx - ELA-Standards-K-12-with-Glossary.pdf. (n.d.). Retrieved June 11, 2017, from file:///C:/Users/Amy/AppData/Roaming/Mozilla/Firefox/Profiles/bqslfhd2.default-1452022823173/zotero/storage/DTDCX8FH/ELA-Standards-K-12-with-Glossary.pdf

Elliott, R., Bohart, A. C., Watson, J. C., & Greenberg, L. S. (2011). Empathy. *Psychotherapy*, *48*(1), 43–49. http://doi.org/10.1037/a0022187

English Language Arts Standards | Common Core State Standards Initiative. (2016). Retrieved October 16, 2016, from http://www.corestandards.org/ELA-Literacy/

Eres, R., Decety, J., Louis, W. R., & Molenberghs, P. (2015). Individual differences in local gray matter density are associated with differences in affective and cognitive empathy. *NeuroImage*, *117*, 305–310. https://doi.org/10.1016/j.neuroimage.2015.05.038

Facione, P. A. (1990). *Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction* (The Delphi Report). The California Academic Press. Retrieved from https://assessment.trinity.duke.edu/documents/Delphi_Report.pdf

Fan, Y., Duncan, N. W., de Greck, M., & Northoff, G. (2011). Is there a core neural network in empathy? An fMRI based quantitative meta-analysis. *Neuroscience & Biobehavioral Reviews*, *35*(3), 903–911. https://doi.org/10.1016/j.neubiorev.2010.10.009

Field, T., Field, T., Sanders, C., & Nadel, J. (2001). Children with autism display more social behaviors after repeated imitation sessions. *Autism*, *5*(3), 317–323. https://doi.org/10.1177/1362361301005003008

Fields, S. K., Mahan, P., Tillman, P., Harris, J., Maxwell, K., & Hojat, M. (2011). Measuring empathy in healthcare profession students using the Jefferson Scale of Physician Empathy: Health provider – student version. *Journal of Interprofessional Care*, *25*(4), 287–293. http://doi.org/10.3109/13561820.2011.566648

Flournoy, J. C., Pfeifer, J. H., Moore, W. E., Tackman, A. M., Masten, C. L., Mazziotta, J. C., … Dapretto, M. (2016). Neural reactivity to emotional faces may mediate the relationship between childhood empathy and adolescent prosocial behavior. *Child Development*, *87*(6), 1691–1702. https://doi.org/10.1111/cdev.12630

Frequently Asked Questions | Common Core State Standards Initiative. (2016). Retrieved December 31, 2016, from http://www.corestandards.org/about-the-standards/frequently-asked-questions/#faq-2323

Gallese, V. (2003). The roots of empathy: The shared manifold hypothesis and the neural basis of intersubjectivity. *Psychopathology*, *2003*(36), 171–180. https://doi.org/10.1159/000072786

Gallese V, Fadiga L, Fogassi L, Rizzolatti G. (1996). Action recognition in the premotor cortex. *Brain* 119:593–609. https://doi.org/10.1093/brain/119.2.593

Geiser, S. & Santelices, M. V., & University of California, B., Center for Studies in Higher Education. (2007). *Validity of high-school grades in predicting student success beyond the freshman year: High-school record vs. standardized tests as indicators of four-year college outcomes. Research & Occasional Paper Series: CSHE.6.07*. Center for Studies in Higher Education.

Georgi, E., Petermann, F., & Schipper, M. (2014). Are empathic abilities learnable? Implications for social neuroscientific research from psychometric assessments. *Social Neuroscience*,

9(1), 74–81. http://doi.org/10.1080/17470919.2013.855253

Georgia.pdf. (n.d.). Retrieved June 7, 2017, from https://www2.ed.gov/programs/racetothetop/phase1-applications/georgia.pdf

Georgia Performance Standards (GPS). (2015). Retrieved from https://www.georgiastandards.org/Standards/Pages/BrowseStandards/BrowseGPS.aspx

Georgia Standards of Excellence (GSE). (n.d.). Retrieved April 23, 2017, from https://www.georgiastandards.org/Georgia-Standards/Pages/default.aspx

GeorgiaStandards.Org - Official Site. (2015) Retrieved March 29, 2016, from https://www.georgiastandards.org/Georgia-Standards/Frameworks/ELA-Grade-7-Standards.pdf

Giancarlo, C. A., Blohm, S. W., & Urdan, T. (2004). Assessing secondary students' disposition toward critical thinking: Development of the California Measure of Mental Motivation. *Educational and Psychological Measurement*, *64*(2), 347–364. https://doi.org/10.1177/0013164403258464

Giancarlo, C. A. (1998). *CM3 - California Measure of Mental Motivation - Test Manual*. California Academic Press LLC.

Giancarlo, C. A. F., & Facione, P. A. (2006). California Measure of Mental Motivation. *CM3*. http://www.insightassessment.com/Products/Products-Summary/Critical-Thinking-Attributes-Tests/California-Measure-of-Mental-Motivation-Level-II

Green, L., Fein, D., Modahl, C., Feinstein, C., Waterhouse, L., & Morris, M. (2001). Oxytocin and autistic disorder: alterations in peptide forms. *Biological Psychiatry*, *50*(8), 609–613. https://doi.org/10.1016/s0006-3223(01)01139-8

Halpern, D. F. (2003). Thought and knowledge: An introduction to critical thinking (4th ed.).

New Jersey Laurence Erlbaum Associates.

Hawk, S. T., Keijsers, L., Branje, S. J. T., Graaff, J. V. der, Wied, M. de, & Meeus, W. (2013). Examining the Interpersonal Reactivity Index (IRI) among early and late adolescents and their mothers. *Journal of Personality Assessment*, *95*(1), 96–106. http://doi.org/10.1080/00223891.2012.696080

Hervey, L., & Kornblum, R. (2006). An evaluation of Kornblum's body-based violence prevention curriculum for children. *The Arts in Psychotherapy*, *33*(2), 113–129. http://doi.org/10.1016/j.aip.2005.08.001

Howard, L.W., Tang, T. L. P., & Austin, M.J. (2015). Teaching critical thinking skills: Ability, motivation, intervention, and the Pygmalion Effect. *Journal of Business Ethics*, *128*(1), 133–147. https://doi.org/10.1007/s10551-014-2084-0

Hurlemann, R., Patin, A., Onur, O. A., Cohen, M. X., Baumgartner, T., Metzler, S., … Kendrick, K. M. (2010). Oxytocin enhances amygdala-dependent, socially reinforced learning and emotional empathy in humans. *Journal of Neuroscience*, *30*(14), 4999–5007. https://doi.org/10.1523/JNEUROSCI.5538-09.2010

Insight Assessment. (2015). *California Measure of Mental Motivation*. (Dee August, Ed.). San Jose, CA: The California Academic Press, LLC.

Jackson, P. L., Brunet, E., Meltzoff, A. N., & Decety, J. (2006). Empathy examined through the neural mechanisms involved in imagining how I feel versus how you feel pain. *Neuropsychologia*, *44*(5), 752–761. https://doi.org/10.1016/j.neuropsychologia.2005.07.015.

Kettler, T. (2014). Critical thinking skills among elementary school students: Comparing identified gifted and general education student performance. *Gifted Child Quarterly*,

58(2), 127–136. https://doi.org/10.1177/0016986214522508

Kindergarten - SeventhGradeRevised2006.pdf. (n.d.). Retrieved June 11, 2017, from https://www.georgiastandards.org/Standards/Georgia%20Performance%20Standards/SeventhGradeRevised2006.pdf

Klapwijk, E. T., Goddings, A. L., Burnett Heyes, S., Bird, G., Viner, R. M., & Blakemore, S. J. (2013). Increased functional connectivity with puberty in the mentalising network involved in social emotion processing. *Hormones and Behavior*, *64*(2), 314–322. http://doi.org/10.1016/j.yhbeh.2013.03.012

Klein, P., Olson, D. R., & Stanovich, K. (1997). Structuring reflection: Teaching argument concepts and strategies enhances critical thinking. *Canadian Journal of School Psychology*, *13*(1), 38–47. https://doi.org/10.1177/082957359701300104

Kohut, H. (1984). How does analysis cure? Chicago: The University of Chicago Press. p. 82

Kornblum, R. (2002). *Disarming the playground : Violence prevention through movement and pro-social skills* (1st ed.). Oklahoma City, OK: Wood & Barnes.

Kurlaender, M., Reardon, S., & Jackson, J. (2014). California dropout research project. Retrieved October 15, 2016, from http://www.cdrp.ucsb.edu/pubs_reports.htm

Litvack-Miller, W., McDougall, D., & Romney, D. M. (1997). The structure of empathy during middle childhood and its relationship to prosocial behavior. *Genetic, Social, and General Psychology Monographs*, *123*(3), 303–324. https://ezproxy.brenau.edu:2040/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=1997-05622-003&site=ehost-live

Malecki, C. K., & Elliot, S. N. (2002). Children's social behaviors as predictors of academic achievement: A longitudinal analysis. *School Psychology Quarterly*, *17*(1), 1–23.

http://doi.org/10.1521/scpq.17.1.1.19902

Müller, C. M., & Gmünder, L. (2014). An evaluation of the “Reading the Mind in the Eyes-Test” with seventh to ninth graders. *Journal of Mental Health Research in Intellectual Disabilities*, *7*(1), 34–44. http://doi.org/10.1080/19315864.2012.714055

Nathanson, L., Rivers, S. E., Flynn, L. M., & Brackett, M. A. (2016). Creating emotionally intelligent schools with RULER. *Emotion Review*, *8*(4), 305–310. https://doi.org/10.1177/1754073916650495

NCA_Final2. (2006). Retrieved February 28, 2016, from http://www.criticalthinking.org/files/NCA_Final2.pdf

Oakley, B. F. M., Brewer, R., Bird, G., & Catmur, C. (2016). Theory of mind is not theory of emotion: A cautionary note on the Reading the Mind in the Eyes Test. *Journal of Abnormal Psychology*, *125*(6), 818–823. http://doi.org/10.1037/abn0000182

Panettieri, R. C. (2015). Teaching techniques. Can critical-thinking skills be taught? *Radiologic* https://media.asrt.org/pdf/publications/RADT15_Vol86_No6.pdf#page=96

Ponnet, K. S., Roeyers, H., Buysse, A., De Clercq, A., & Van Der Heyden, E. (2004). Advanced mind-reading in adults with Asperger syndrome. *Autism*, *8*(3), 249–266. https://doi.org/10.1177/1362361304045214

Reed, J. H. (1998, December) *Effect of a model for critical thinking on student achievement in primary source document analysis and interpretation, argumentative reasoning, critical thinking dispositions, and history content in a community college history course* (Dissertation). University of South Florida. Retrieved from http://www.criticalthinking.org/resources/JReed-Dissertation.pdf

Rimiene, V. (2002). Assessing and developing students’ critical thinking. *Psychology Learning*

& Teaching, *2*(1), 17–22. https://doi.org/10.2304/plat.2002.2.1.17

Rizzolatti, G., & Craighero, L. (2004). The mirror neuron system. *Annual Review of Neuroscience*, *27*(1), 169–192. https://doi.org/10.1146/annurev.neuro.27.070203.144230

Şahin, M. (2012). An investigation into the efficiency of empathy training program on preventing bullying in primary schools. *Children and Youth Services Review*, *34*(7), 1325–1330. http://doi.org/10.1016/j.childyouth.2012.03.013

Schonert-Reichl, K. A., Oberle, E., Lawlor, M. S., Abbott, D., Thomson, K., Oberlander, T. F., & Diamond, A. (2015). Enhancing cognitive and social–emotional development through a simple-to-administer mindfulness-based school program for elementary school children: A randomized controlled trial. *Developmental Psychology*, *51*(1), 52–66. https://doi.org/10.1037/a0038454

Shadish, W. R., Cook, T. D., & Campbell, D.T. (2002). *Experimental and quasi-experimental designs for generalized causal inference* (2nd edition) United States: Wadsworth Cengage Learning,

Shamay-Tsoory, S. G., Aharon-Peretz, J., & Perry, D. (2009). Two systems for empathy: a double dissociation between emotional and cognitive empathy in inferior frontal gyrus versus ventromedial prefrontal lesions. *Brain*, *132*(3), 617–627. https://doi.org/10.1093/brain/awn279

Spinella, M. (2005). Prefrontal substrates of empathy: Psychometric evidence in a community sample. *Biological Psychology*, *70*(3), 175–181. http://doi.org/10.1016/j.biopsycho.2004.01.005

SA-Rec-Reading-CCSR-Noncog-RF-Full-Report-Revision-(1.14).pdf. (2014). Retrieved April 22, 2016, from https://raikesfoundation.blob.core.windows.net/media/SA-Rec-Reading-

CCSR-Noncog-RF-Full-Report-Revision-(1.14).pdf

TAPS_Reference_Sheet 6-5-14.pdf. (n.d.). Retrieved June 11, 2017, from http://www.gadoe.org/School-Improvement/Teacher-and-Leader-Effectiveness/Documents/FY15%20TKES%20and%20LKES%20Documents/TAPS_Reference_Sheet%206-5-14.pdf

Taylor, S. J., Barker, L. A., Heavey, L., & McHale, S. (2013a). The typical developmental trajectory of social and executive functions in late adolescence and early adulthood. *Developmental Psychology*, *49*(7), 1253–1265. http://doi.org/10.1037/a0029871

Taylor, Z. E., Eisenberg, N., Spinrad, T. L., Eggum, N. D., & Sulik, M. J. (2013b). The relations of ego-resiliency and emotion socialization to the development of empathy and prosocial behavior across early childhood. *Emotion*, *13*(5), 822–831. https://doi.org/10.1037/a0032894

Teacher Keys Effectiveness System. (n.d.). Retrieved June 12, 2017, from https://www.gadoe.org/School-Improvement/Teacher-and-Leader-Effectiveness/Pages/Teacher-Keys-Effectiveness-System.aspx

The Elementary and Secondary Education Act (The No Child Left Behind Act of 2001). (2010, December 6). [Laws]. Retrieved January 22, 2017, from https://www2.ed.gov/policy/elsec/leg/esea02/index.html

The NCES Fast Facts Tool (National Center for Education Statistics). (n.d.). Retrieved March 5, 2017, from https://nces.ed.gov/fastfacts/display.asp?id=719

Tonks, J., Williams, W. H., Frampton, I., Yates, P., & Slater, A. (2007). Assessing emotion recognition in 9-15-years olds: Preliminary analysis of abilities in reading emotion from faces, voices and eyes. *Brain Injury.* 21, 623–629.

https://doi.org/10.1080/02699050701426865

Wagner T. (2008). The global achievement gap: Why even our best schools don't teach the new survival skills our children need—And what we can do about it. New York, NY: Basic Books. Google Scholar. https://scholar.google.com/scholar?hl=en&q=The+global+achievement+gap%3A+Why+even+our+best+schools+don%27t+teach+the+new&btnG=&as_sdt=1%2C11&as_sdtp

Walton, G. M., & Cohen, G. L. (2011). A brief social-belonging intervention improves academic and health outcomes of minority students. *Science*, *331*(6023), 1447–1451. https://doi.org/10.1126/science.1198364

Watson, N. V., & Breedlove, S. M. (2012). *The mind's machine: Foundations of brain and behavior*. Sunderland, MA: Sinauer Associates, Inc.

Wentzel, K. R. (1993). Does being good make the grade? Social behavior and academic competence in middle school. *Journal of Educational Psychology*, *85*(2), 357. https://doi.org/10.1037//0022-0663.85.2.357

White, D. A. (2010). Gifted education: Thinking (with help from Aristotle) about critical thinking. *Gifted Child Today*, *33*(3), 14–19. https://ezproxy.brenau.edu:2040/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=tfh&AN=52217352&site=eds-live

Yang, Y. T. C., Newby, T., & Bill, R. (2008). Facilitating interactions through structured web-based bulletin boards: A quasi-experimental study on promoting learners' critical thinking skills. Computers & Education, 50, 1572–1585. http://doi:10.1016/j.compedu.2007.04.006

Yeager, D. S., & Walton, G. M. (2011). Social-psychological interventions in education: They're

not magic. *Review of Educational Research*, *81*(2), 267–301. http://doi.org/10.3102/003465311405999

Yu, C., & Chen, K. (2012). Experiencing simulated aging improves knowledge of and attitudes toward aging. *Journal of the American Geriatrics Society*, *60*(5), 957–961. http://doi.org/10.1111/j.1532-5415.2012.03950.x