Children's Metacognitive Development and Learning Cognitive Behavior Therapy

By

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To my parents, who live and teach the values of compassion and intellectual curiosity

and

To my husband, Frank, who provides daily love and encouragement

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CHAPTER I

INTRODUCTION

Pediatric-onset depression is a recurrent and persistent disorder associated with impairment in multiple domains and increased risk for substance use disorders and suicide (Birmaher et al., 1996). Therefore, finding efficacious treatments for depression in youth is of critical importance. Psychotherapies have been shown to successfully reduce depression in children and adolescents, although the overall effect size has been modest (ES=.34; Weisz, McCarty, & Valeri, 2006). Thus, there is considerable room to improve upon the outcomes of existing treatments for depression in youth.

Development and Treatment

One possible explanation for the relatively modest effects of therapy for pediatric depression is that only limited attention has been paid to the developmental demands of the various therapeutic strategies that comprise the different interventions. Although incorporating developmental considerations into treatment planning has been recognized as important (Eyberg, Schuhmann, & Rey, 1998; Ollendick, Grills, & King, 2001; Shirk, 1988), clinical researchers generally have not actually applied a developmental framework to therapy (Holmbeck & Kendall, 1991; Shirk, 1999). Many interventions for youth depression have been downward extensions of adult treatment approaches (Stallard, 2002). As these interventions have been derived, in part, from theories of adult psychopathology and therapy, the extent to which these treatments are appropriate for less cognitively developed individuals is unclear.

Differences in treatment efficacy have been found as a function of age, with effect sizes generally larger for adolescents than for children (Durlak, Furhman, & Lampman, 1991; Weisz, Weiss, Han, Granger, & Morton, 1995). Clinical researchers have long recognized the importance of studying age-related differences in treatment responses (Furman, 1980), although no study has explicitly assessed children's developmental level separately from age or has tested whether development moderates treatment outcomes (Eyberg et al., 1998; Holmbeck, O'Mahar, Abad, Colder, & Updegrove, 2006).

The terms "age" and "development" are often used interchangeably, but they are not synonymous (Durlak & McGlinchey, 1999; Holmbeck & Kendall, 1991). Development is significantly more complex and heterogeneous than the linear progression of chronological age; that is, children of the same age can vary widely in their level of development (Sauter, Heyne, & Westenberg, 2009; Weisz, Weiss, Alicke, & Klotz, 1987). Therefore, using developmental level to guide treatment decisions may decrease the chances of erroneous developmental assumptions based on age alone (Durlak et al., 1991; Holmbeck & Kendall, 1991).

In 1980, Furman described the current state of developmental tailoring of interventions as follows:

> It should be emphasized that we are not arguing that behavioral investigators have cavalierly applied the same treatment program to children and adults of all ages. Such an argument is patently false. It is our position, however, that the developmental modifications of treatment programs have been based almost exclusively on subjective judgments rather than on empirical evidence. (p.2)

Although recognition of the importance of developmental factors in therapy has increased over the last two decades (Holmbeck et al., 2006), the construction of developmentally sensitive treatments has been mostly informal and superficial (e.g., linguistic changes, child-friendly materials), rather than systematic and empirically-driven (Masten & Braswell, 1991; Ollendick et al., 2001).

Children have more difficulty than adults revising their thoughts when presented with information that contradicts a belief (Kinney, 1991; Shirk, 1988). As a result, one common, *informal* recommendation for developmental tailoring cognitive behavioral therapy (CBT) has been to use the core cognitive skills (i.e., identifying thinking errors, examining underlying beliefs, and using Socratic questioning) only with more cognitively advanced youth (Harrington, 2005; Siqueland, Rynn, & Diamond, 2005; Stallard, 2009). The extant research examining the relation between "development" and therapeutic efficacy, however, has not actually measured cognitive development; rather age typically has been used as an estimate of developmental level (Doherr, Reynolds, Wetherly, & Evans, 2005; Eyberg, et al., 1998). No empirical study has yet examined variations in the efficacy of cognitive skills as a function of a child's level of cognitive development. That is, studies of developmentally sensitive treatments have neither explicitly assessed cognitive development nor examined its relation to the ability to learn specific therapeutic skills. This paucity of research may be due, in part, to the fact that "cognitive development," encompasses a wide array of abilities that may be uniquely linked to clinical skills and follow distinct developmental trajectories.

Metacognition

Metacognition is a specific area of cognitive development that has been highlighted as integral for successful engagement in therapy (Grave & Blissett, 2004). Metacognition, or "thinking about thinking," was introduced as a novel topic of inquiry in cognitive development research (Flavell, 1971). The term metacognition was defined as "any knowledge or cognitive process that is involved in the appraisal, monitoring, or control of cognition" (Flavell, 1979, p.

906). Since then, the definition of metacognition has been broadened to include many aspects of an individual's knowledge of his or her own cognitive processes, including learning, memory, comprehension, and problem solving (Schneider & Lockl, 2002).

In the current study, metacognition was defined as the ability to engage in cognitive monitoring -- that is, the capacity to know the contents of one's mind from moment-to-moment (Wellman, 1985). Metacognition involves reflecting on one's own thoughts, which results in an understanding of one's mental state (Flavell, 1979; 1987). Such awareness of one's mental activity is fundamental for learning and implementing skills taught in cognitive therapy, and therefore is the focus of the current study.

Being aware of one's thoughts and the ability to monitor them are important for engaging in and learning various therapeutic skills (Remmel & Flavell, 2004). Cognitive behavior therapy (CBT) emphasizes the active use of problem solving and information processing skills. Whether and how children monitor their mental processes may impact their capacity to participate successfully in many of the cognitively demanding CBT skills (Vasey, 1993).

Three types of metacognitive knowledge may be related to children's ability to engage in therapy: (1) person, (2) task, and (3) strategy (Flavell, 1979). *Person* metacognitive knowledge refers to knowledge and beliefs about one's self and others as cognitive processors, both inter-individually (i.e., self compared to others) and intra-individually (i.e., variations within oneself). CBT demands active use of intra-individual knowledge. In particular, the cognitive aspects of CBT require that children be able to reflect on their thoughts, monitor their thoughts, and draw connections among their thoughts, feelings, and behaviors (Grave & Blissett, 2004; R. Harrington, Wood, & Verduyn, 1998; Steiner, 2004)

Task metacognitive knowledge involves understanding the cognitive or affective task that must be accomplished (Flavell, 1979). For example, CBT teaches children to recognize that negative thoughts can maintain a depressed mood. They then are encouraged to identify any negative thoughts and specific types of cognitive distortions (e.g., catastrophic thinking, all-or-none thinking, making a mountain out of a molehill). Children who lack metacognitive awareness of task knowledge will have difficulty understanding that the objective is to notice their thoughts (e.g., global, stable, and internal attributions about negative events). Once children identify their automatic negative thoughts, they then are taught to restructure (i.e., modify) them. *How* thoughts are modified involves the third type of metacognitive knowledge -- strategy.

Strategy knowledge refers to the understanding of what strategies are likely to be effective for accomplishing a cognitive or affective task. In CBT, once children notice their automatic negative thoughts, they then are encouraged to examine them for accuracy. The strategy of asking a set of questions to test the validity of a thought (e.g., "Is that really true?" "What are alternative explanations?") facilitates the weighing of evidence for and against a belief. Knowing when and how to use this strategy for restructuring thoughts involves metacognition. Thus, metacognitive abilities are needed for noticing one's thoughts, identifying specific distortions, and selecting and implementing strategies for restructuring those thoughts.

Metacognitive Development and CBT

Knowledge about the normative developmental trajectory of metacognition may help clinicians to more effectively deliver interventions such as CBT that have strong metacognitive demands (Bacow, Pincus, Ehrenreich, & Brody, 2009; Quakley, Reynolds, & Coker, 2004; Schneider & Lockl, 2002). Metacognition generally develops between the ages of 8 and 13, which was the target age range in the current study. Typically by age 8, children have a sound understanding of thinking (Quakley et al., 2004), recognize that thinking is a process (Flavell, Green, Flavell, & Grossman, 1997), that thoughts can be difficult to control (Flavell, Green, & Flavell, 1998), and that thoughts and feelings are linked (Flavell, Flavell, & Green, 2001). Also, children tend to be aware of their own inner speech, perhaps through noticing their covert self-talk while reading, writing, and adding (Flavell et al., 1997). Further, by about age eight, children are able to report that they have thoughts even when instructed not to think, describe mental strategies used to try to prevent certain thoughts, and indicate why *not thinking* is difficult. Thus, children become increasingly aware of mental events, particularly concerning the spontaneous nature of cognitions (Flavell, Green, & Flavell, 2000). In addition, they begin to recognize that thinking can trigger subsequent thoughts and feelings (Flavell et al., 2001) and appreciate that the mind interprets events and generates thoughts (Barquero, Robinson, & Thomas, 2003). For example in middle-childhood, youth begin to recognize that people's pre-existing biases may influence the way they interpret an ambiguous event (Pillow & Henrichon, 1996).

More advanced comprehension of mental experiences continues to develop during pre-adolescence (Cartwright-Hatton et al., 2004; Ormond, Luszcz, Mann, & Beswick, 1991). Between the ages of 9 and 13, children improve in their understanding of the mind's uncontrollability. Specifically, 13-year-olds were better than 9-year-olds at knowing that people will experience certain thoughts even if they do not want to and try not to (Flavell et al., 1998). Young adolescents understand that, when awake, people experience a continuous "stream of consciousness," even when not engaged in a cognitive task (Flavell, Green, & Flavell, 1993). Flavell and colleagues (1998) showed that about one-third of 13-year-olds and half of adults recognized that inhibiting mental activity completely was impossible. Thus by about age 13, youth are aware that thoughts sometimes can happen automatically, involuntarily, and with varied controllability (Flavell, 1999).

In summary, children's metacognitive abilities mature markedly during early adolescence. Heterogeneity of development within age is particularly characteristic of this period. That is, children of the same age may perform differently on the same tasks. Because of this within-age variability in metacognition, an accurate assessment of a child's specific level of metacognition may be more informative than age alone when trying to determine if a child is developmentally ready for interventions that require such metacognitive abilities.

Effectively adapting therapy to children's level of metacognition involves bridging developmental and clinical research by connecting specific therapeutic skills with the developmental abilities necessary for engaging in them. Whereas treatment studies provide the scientific basis for selecting the most efficacious approaches for improving symptoms, developmental research supplies the empirical information about the normative emergence and growth of various developmental abilities over time. The gap between these two relatively insular fields has been highlighted for several decades but without much empirical progress (Holmbeck & Kendall, 1991; Shirk, 1988). The current study aimed to directly connect these two areas of research to address the question: Does cognitive development, specifically metacognition, predict children's ability to learn the skills taught in cognitive behavior therapy?

The Current Study

The present study addressed several other important and as of yet unexamined questions. First, is metacognition related to knowledge of skills taught in cognitive behavior therapy, prior to any formal instruction or learning about these skills? In the absence of psychological symptoms, the cognitive skills taught in CBT (e.g., cognitive restructuring) may develop naturally over time, such that more cognitively developed youth likely will demonstrate more knowledge about these skills.

Second, is knowledge of CBT skills (prior to formal instruction) related to symptoms of psychopathology? One assumption underlying skills-based interventions is that children with psychological symptoms (and therefore enter therapy) are deficient in their knowledge of certain skills that will be taught in treatment, and that acquisition of this knowledge will help reduce their symptoms. Another aim of this study was to examine the relation between symptoms and knowledge of specific CBT skills.

Evidence exists that children with various types of cognitive distortions are at risk for depression (Abela & Hankin, 2011), which has led to the use of treatments that teach children how to restructure their negative beliefs. Studies, however, have not yet examined whether high levels of symptomatology are associated with greater deficiencies in the ability to restructure negative thoughts. Therefore, the current study explored the relation between children's symptoms of psychopathology and their knowledge of the skills taught in CBT.

Finally, if children who are less cognitively developed have less knowledge of therapeutic skills, and deficiencies in this knowledge are related to symptoms, then children who are less cognitively developed might have more symptoms. On the other hand, some researchers have suggested that more advanced metacognition (e.g., the ability to think about one's thinking; Bell, Wieling, & Watson, 2004) actually puts children at risk for developing psychopathology because of a greater likelihood of rumination and worry. The relation between children's metacognitive abilities and the extent of their symptoms has yet to be examined, and therefore, was explored in the current study.

What accounts for the relation between cognitive developmental level and the ability to learn CBT skills? In cognitive behavioral interventions, therapists often assign weekly "homework" as a way for patients to practice and apply skills taught in sessions. The specific benefits conferred to youth as a function of doing homework exercises are unclear. A meta-analysis revealed that homework assignments improve CBT outcomes for adults (d = 1.08; Kazantzis, Whittington, & Dattilio, 2010). Metacognitive level may be related to performance on these homework exercises, which in turn may impact learning of the CBT skills. The current study examined whether homework performance at least partially accounted for the link between level of metacognition and learning of CBT skills.

Completion of homework also is likely to be directly related to learning the therapeutic skills. However, this relation may be moderated by children's metacognitive development. That is, the association between homework completion and children's learning may be stronger for those with more advanced metacognitive skills. Therefore, we examined whether level of metacognitive development moderated the relation between homework completion and retention of learning. We similarly tested whether level of metacognitive development moderated the relation between performance on the homework assignment and retention of learning a week later.

The following research questions and hypotheses were examined:

1. Primary Question: What is the relation among level of metacognitive development, age, and learning of CBT skills?
    a. Does level of metacognitive development predict children's ability to learn cognitive behavior therapy skills? Hypothesis 1: Higher levels of metacognition will predict a significant increase in knowledge of CBT skills.

b. Does level of metacognitive development increment the prediction of learning of CBT skills, over and above age and IQ? Hypothesis 2: Controlling for age and IQ, higher levels of metacognition will predict a significant increase in knowledge of the skills taught in CBT.

2. Secondary Question: What is the relation among metacognitive level, knowledge of CBT skills, and psychopathology:

   a. What is the relation between metacognitive level and knowledge of CBT skills?

      Hypothesis 3: There will be a significant positive relation between metacognitive level and knowledge of CBT skills at the baseline assessment.

   b. What is the relation between knowledge of CBT skills and symptoms of psychopathology? Hypothesis 4: Greater knowledge of CBT skills will be significantly associated with fewer symptoms of psychopathology.

   c. What is the relation between level of metacognition and symptoms of psychopathology? No directional hypothesis is made here.

3. Moderation: Is the relation between children's metacognitive level and increases in knowledge of CBT skills moderated by (a) whether children complete their homework or (b) the quality of the homework completed? Hypothesis 5: The relation between metacognitive level and retention of knowledge about the skills taught in cognitive behavior therapy will be significant for those who complete the homework, but not for those who do not complete the homework. Hypothesis 6: The relation between metacognitive level and retention of knowledge about CBT skills will be significant for those who perform well as compared to those who perform less well on the homework.

4. Mediation: Does performance on the homework assignments mediate the relation between metacognition and the extent of learning the cognitive behavior therapy skills? Hypothesis 7: Children with higher levels of metacognition will perform better on their homework, and children who perform better on their homework will be more likely to learn the CBT skills. The relation between metacognition and learning of CBT skills will be partially accounted for by this pathway.

CHAPTER II

METHOD

Participants

Participants were 234 children and adolescents (59% male), ages 9 to 16 (*Mean* = 12.84 years, *SD* = 1.91). The sample was 83% Caucasian, 7% African American, 7% Multi-racial, 4% other races; 4% of the sample was Hispanic. Participants were recruited from an elementary, middle, and high school in a local school district in the Southeastern United States. Letters explaining the study and consent forms were sent home to parents. All children for whom parental consent was obtained were invited to participate. All procedures were approved by the Institutional Review Board for the protection of human subjects at Vanderbilt University.

Although the relation between development and therapy is most important for children with psychopathology, a central tenet of developmental psychopathology is to base our understanding of clinical phenomena within the framework of typical development. As such, a first step toward that end was to examine these relations in a normative sample of children.

Exclusion criteria were the presence of any condition (e.g., developmental delay; autism spectrum disorder; learning or reading problems; significant medical condition) that would prevent the child from being able to understand and complete the assessment battery. Nine children who participated were excluded due to having IQ scores less than or equal to 80, resulting in a final analytic sample of 225 participants. The mean IQ for this final sample was 106.42 (*SD* = 12.98).

The follow-up assessment was completed by 94.7% of the participants (N=213). Those that did not complete the follow-up fell into three categories: (a) declined (N=4); (b) scheduling difficulties (N=4); and (c) no response (N=4). The average amount of time between Sessions 1 and 2 was nine days (*SD* = 4.19). Participants received $25 for Session 1 and $10 for Session 2.

Measures

Metacognitive Ability. The *Metacognitions Questionnaire for Children* (MCQ-C; Bacow, Pincus, Ehrenreich, & Brody, 2009) is a self-report measure designed for children ages 7 to 17. We administered the 6-item Cognitive Monitoring (CM) subscale, which measures awareness of one's own thoughts (e.g., "I am always thinking about the thoughts in my head."). We modified the original MCQ-C 4-point Likert scale to a 6-point Likert scale to increase the range of response options and thus, the variability. Possible scores ranged from 6 to 36. The questionnaire took about 5 minutes to complete. Test-retest reliability for the CM subscale has been found to be 0.83. Internal consistency for this sample was $\alpha = .72$.

The *Mental Uncontrollability Task* (MUT) is a short story and interview developed by Flavell, Green, and Flavell (1998). The MUT assesses children's understanding that people have only limited control over their mental activity; that is, it measures children's recognition that people can have thoughts that are unwanted or hard to prevent.

Participants were presented with two short stories. In one story, a child who, while awaiting a shot in the doctor's office, sees a shot needle. It was emphasized that this child does not want to think about getting a shot and is trying very hard never to do so. The participant then was asked whether or not the child in the story will think about getting a shot while looking at the shot needle.

The second story features a child who does not want to think or wonder about anything for an hour. Suddenly, he hears a loud screeching sound from his back yard; the participant was asked whether or not, on hearing that noise, the child in the story is wondering what caused the noise. Questions concerning the controllability of thinking followed these two scenarios; the order of the stories was counterbalanced. The entire task took about 10 minutes.

Responses were scored correctly if children answered that the protagonists would, rather than would not, think about the shot or wonder about the noise. Participant's justifications for their responses were coded "adequate justification," according to Flavell et al. (1998), if the answer met the most minimal standards of relevance. For example, a justification for the Shot story was coded as "adequate" if the child stated that the protagonist sees the shot needle, or that s/he does not want to get a shot. Answers scored as "not adequate" primarily consisted of "I don't know," irrelevant answers, or uninterpretable answers. Children were given a score of 1 for correct answers and 0 for incorrect answers on the four "think rather than not think" questions (see italicized portions of script, Appendix B). Children also were given a score of 1 for adequate justifications and 0 for inadequate justifications on the three justification questions (i.e., Shot, Noise, Three-Days). All adequate justifications were further coded as: specific, general, or paradoxical. These scores were combined into a total score, which ranged from 0 to 13. Cronbach's alpha for this sample was $\alpha = 0.60$.

Symptoms of Psychopathology. The Children's Depression Inventory (CDI; Kovacs, 1992) was used to assess children's self-reported symptoms of depression. The suicide item was removed due to concerns of school administrators. Each of the remaining 26 items lists three statements in order of symptom severity. Internal consistency, test-retest reliability, and convergent validity have been well-documented for the CDI (Kovacs, 1992). Internal consistency for this sample was α = .82.

The *Screen for Child Anxiety Related Emotional Disorders* (SCARED; Birmaher et al., 1997) is a 41 item self-report measure for children ages 8 and older. Responses are scored on a 3-point Likert scale. The SCARED measures symptoms of anxiety disorders, and yields five factor scores (i.e., general anxiety, separation anxiety, social phobia, school phobia, and physical symptoms of anxiety) and a Total score. The current study examined the overall SCARED Total score. The SCARED has good internal consistency and test-retest reliability (α=.90; ICC=.86; Birmaher et al., 1997). Internal consistency of the Total score for this sample was α = 0.91.

The *Youth Self-Report* (YSR; Achenbach & Rescorla, 2001) contains 111 items assessing both internalizing and externalizing symptoms. In the current study, we examined six narrow subscales (i.e., Anxious/Depressed, Withdrawn/Depressed, Somatic Complaints, Affective Problems, Anxiety Problems, and Somatic Problems) and three broad subscales (i.e., Internalizing Problems, Externalizing Problems, Total Problems); raw scores were used in the analyses. Internal consistency for the YSR ranges from α=.71-.95 (Achenbach & Rescorla, 2001).

Intelligence Quotient (IQ). Children's ability to learn therapeutic skills may be affected by their intellectual functioning; therefore we obtained an estimate of IQ to control for these possible effects. The Wechsler Intelligence Scale for Children - Fourth Edition (WISC-IV) is the most widely used individual intelligence test for children. The WISC-IV yields a Verbal Comprehension Index (VCI) and a Perceptual Reasoning Index (PRI). A two-subtest short form for the WISC-IV, which contains one subtest from the VCI (i.e., Vocabulary subtest) and one subtest from the PRI (i.e., Block Design subtest) has been shown to correlate about .90 with the full-administration Full Scale IQ (Sattler, 2008). The Vocabulary subtest measures word knowledge and verbal comprehension, whereas the Block Design subtest taps the ability to analyze visually presented information and understand visual-spatial information. These two subtests were combined to provide an estimate of a child's overall IQ.

Knowledge of Therapeutic Skills (KnoTS). No formal measure of children's knowledge of the therapeutic skills taught in depression treatment programs exists. Some depression treatment manuals include informal "knowledge checks" in order to review the material covered, but these questions have not been combined into a formal assessment of this knowledge. Based on the skills taught in the first three sessions of the Penn Resiliency Program (Jaycox, Reivich, Gillham, & Seligman, 1994; see Procedure for more information about this program), we created a measure of children's knowledge of therapeutic skills (Herrington, Frankel, & Garber, 2011). This measure includes multiple choice as well as open-ended questions, which were coded for accuracy. KnoTS items were designed to assess understanding of the cognitive model, cognitive distortions, and cognitive restructuring skills. Items were distributed equally among four forms of the measure (i.e., Form A, B, C, & D).

For the purposes of understanding the relation between metacognition and learning, the scales of the KnoTS that were most relevant were Sections 4, 5, 6, and 7 and the overall Total KnoTS score. We hypothesized that these four scales would be particularly metacognitively demanding because they each required children to generate thoughts. To do so, children must think about what they may think in a given (or generated) problem situation, and then write that down as a response.

Table 1. KnoTS Section Descriptions

Section Number	Section Name - Description
Total KnoTS	Total Cognitive Behavior Therapy Skills Knowledge (all sections included)
Section 1	Identifying Situations, Thoughts, and Behaviors
Section 2	General Knowledge Multiple Choice
Section 3	Examining Evidence for/against Thought
Section 4	Generating Thought for a Situation/Feeling
Section 5	Generating Personal Problem, Thought, Feeling and Behavior
Section 6	Generating Not Always Bad Thought, Feeling, Behavior
Section 7	Generating Personal Problem, Always Bad Thought, Feeling, and Behavior and also Not Always Bad thought, Feeling, and Behavior for same problem

Procedure

Session One. Fifty-four small groups of two to six participants (*Mean*=4.33; *SD*=1.21) attended a 3.5-hour session during their fall or spring school break. All participants first completed a form of the KnoTS (KnoTS.1) to assess their baseline knowledge of CBT skills. This session was divided into two parts, "Assessment" and "Teaching," counterbalanced by group. Children were given a ten-minute break between parts. In the assessment part of the session the CDI, SCARED, YSR, MUT, and MCQ-C were administered. In the teaching part of the session, two clinical psychology doctoral candidates (KGH, SF) taught a condensed version of the first three lessons of the Penn Resiliency Program (PRP; Jaycox et al., 1994).

PRP is an established, efficacious group early intervention program for depression for children ages 8 to 15 (Yu & Seligman, 2002). The first three sessions of PRP focus on cognitive therapy skills: understanding the cognitive model, cognitive distortions, and cognitive restructuring. PRP provides a detailed manual including scripts and activities. Materials from the PRP manual for these sessions were consolidated into one 90-minute teaching session administered to all participants.

Participants completed a different form of the KnoTS after the assessment part of the session (KnoTs.2) and also after the teaching part of the session (KnoTS.3). Children were given homework based on PRP and were instructed to bring the completed assignment with them to their follow-up session. Homework took children about 30 minutes to complete.

In order to assess for possible practice effects of taking the KnoTS a second time, participants were randomly assigned to one of two orders (see Table 2 for the summary of when each KnoTS was administered). Those assigned to Order 1 received a KnoTS assessment, the teaching session, and their second KnoTS assessment, whereas those assigned to Order 2 received a KnoTS assessment, the assessment session, and their second KnoTS assesssment. This study design enabled us to examine whether changes in KnoTS scores were due to learning or simply to taking the KnoTS again.

Table 2. Order of KnoTS administration, Teaching part, Assessment part and Session 2

Order 1:	Teach First	KnoTS.1	Teach	KnoTS.2	Assess	KnoTS.3	Session 2	KnoTS.4
Order 2:	Assess First	KnoTS.1	Assess	KnoTS.2	Teach	KnoTS.3	Session 2	KnoTS.4

Note. Shaded cells were the “immediate learning” scores.

Session Two. One week after session 1, participants attended a one-hour session after school or during school break. Participants completed KnoTS.4 to assess their retained knowledge of the CBT skills. The four forms of the KnoTS (i.e., A, B, C, and D) were counterbalanced across all administrations. The Vocabulary and Block Design subtests of the WISC-IV also were administered, and the homework was collected. As mentioned above, twelve participants did not participate in session two. These participants did not differ from the others who completed both sessions regarding any demographic, predictor, or outcome variables. Because IQ data were not collected for these 12 participants, they were excluded from analyses that controlled for IQ.

Data Analytic Plan

Primary Questions. To examine the relation between metacognition and learning, a linear regression analysis was conducted with metacognition as the independent variable and immediate learning as the dependent variable (see Table 2). A similar linear regression was conducted to examine the relation between metacognitive development and retained learning at follow-up, with metacognitive development as the independent variable and follow-up KnoTS scores as the dependent variable (see Table 2). Separate regression analyses were conducted for each metacognition measure (i.e., MCQ-C and MUT). The first set of analyses was conducted controlling for baseline knowledge, and the second set of analyses controlled for baseline knowledge, age, and IQ.

Secondary Questions. Partial correlations among metacognition, symptoms of psychopathology, and baseline knowledge were used to examine the strength of the relations between individual pairs of these variables. All partial correlations were adjusted for age and IQ.

To examine whether homework completion moderated the relation between metacognitive level and retention of learning at follow-up, we conducted a linear regression with the main effects of homework completion (yes or no) and metacognition entered in the first step, and their interaction entered in the second step. We conducted a parallel set of analyses to examine whether homework performance moderated the relation between metacognitive level and retention of learning.

To test whether homework performance mediated the relation between metacognitive level and retained learning (at follow-up), the following steps outlined by Baron and Kenny

(1986) were used: first we tested whether metacognitive level predicted homework performance; next, we tested whether homework performance predicted retained learning at follow-up. We conducted a Sobel test to determine whether the relation between metacognition and retained learning changed significantly with the inclusion of the indirect effect (i.e., homework performance). Separate mediation analyses were conducted for each measures of metacognition. All moderation and mediation analyses controlled for age and IQ.

Preliminary Analyses

KnoTS Difficulty Analyses. The KnoTS was created for measuring youth's knowledge of cognitive skills that were taught in the first three sessions of PRP. To determine changes in scores on the KnoTS were due to learning, we needed to ensure that all four forms were of similar difficulty. Each form of the KnoTS has seven sections. In Sections 1-3, answers were either correct or incorrect (noncoded) and Sections 4-7 contained short-answers that were coded for correctness. We conducted an ANCOVA analysis controlling for age and IQ with the KnoTS form (i.e., A, B, C or D) as the between subjects factor and each section as the dependent factor. If the section was significantly different across forms, then we examined the difficulty level of the individual items that comprised that section. For the noncoded sections, we examined the percentage of people who got the question right. If the section was not equivalent in difficulty across the four forms, then we eliminated one item from each form: for example, the easiest item from Form A, the hardest from C and D, and an intermediate item from B.

For coded sections, we conducted ANCOVAs and post-hoc comparisons to determine which items were significantly different; these items then were eliminated from all forms. For sections 5 and 7, the ANCOVAS were not significantly different so all items were retained. Finally, we re-ran the original ANCOVA for all four forms, controlling for age and IQ, and found no significant differences across KnoTS forms in level of difficulty. These preliminary analyses and counterbalancing the four forms of the KnoTS indicate that changes in KnoTS scores likely were due to learning the CBT skills. The average internal consistency of the four KnoTS forms was $\alpha = .82$ (*Range* = .79-.86).

Coding of KnoTS and Homework Items. KnoTS sections 4-7 were coded by the two independent raters (KGH and SF). To examine inter-rater reliability, 20% of each KnoTS form (A, B, C, and D) were randomly chosen to be coded twice. The ICC for KnoTS coding reliability was 0.92 (*Range* = 0.73-1.00). The homework also was coded by the two raters; a randomly selected 20% (N=32) of the homework packets were coded twice. The ICC for homework reliability = 0.96 (*Range* = 0.8-1.00).

KnoTS Practice Effects. To test whether changes in KnoTS scores following the teaching session were due to learning or practice effects, we compared the KnoTS.2 scores for Groups 1 and 2 (see Table 2). A linear regression analysis was conducted with Group (i.e., assessment first vs. teaching first) predicting KnoTS.2 Total score, controlling for age, IQ, and KnoTS.1 Total score. Results indicated a significant effect of Group on the KnoTS.2 Total Knowledge score ($F = 34.93$, $p < .001$; Adjusted $R^2 = .39$; $B = 1.39$, $p = .002$), such that children who completed the teaching session first had significantly higher KnoTS.2 scores than those who completed the assessment session first (see Figure 1).

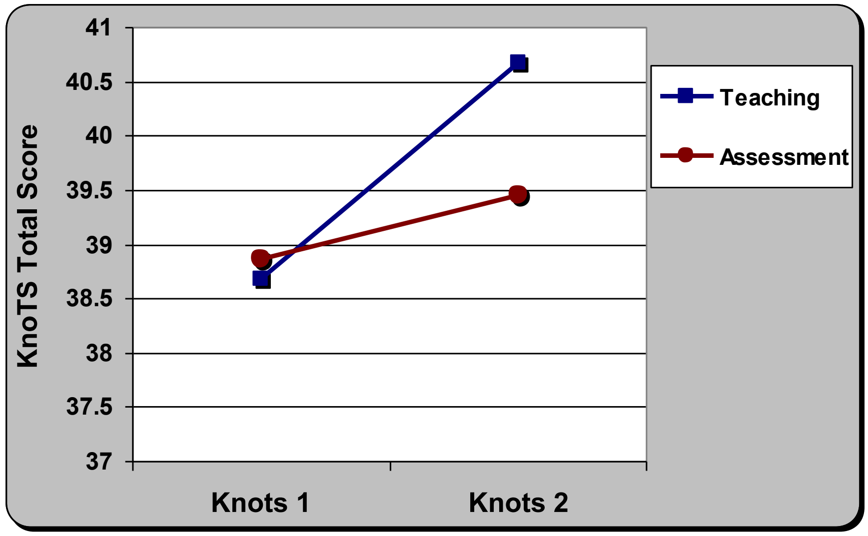

Figure 1. Effect of Group (i.e., order of Teaching vs. Assessment) on KnoTS.2 Scores

CHAPER III

RESULTS

Primary Questions

Does level of metacognitive development predict the learning of the skills taught in CBT? Linear regressions were conducted with MCQ-C scores predicting knowledge at immediate learning and follow-up, controlling for baseline KnoTS score. Separate linear regressions were conducted with the MCQ-C and MUT scores. Higher levels of metacognition measured with the MCQ-C significantly predicted learning of Generating a Thought for a Situation/Feeling (KnoTS section 4) (β = .003, df = 2, p = .004), controlling for baseline KnoTS. Higher levels of metacognition also significantly predicted retained learning on the KnoTS Total score (β = .088, df = 2, p = .029), controlling for baseline KnoTS. No significant findings emerged from the MUT scores; in the remaining results, metacognition refers to MCQ-C scores.

Does level of metacognitive development increment the prediction of learning, over and above age? Linear regressions were conducted with MCQ-C scores predicting immediate and retained knowledge, controlling for baseline KnoTS, age, and IQ. Higher levels of metacognition significantly predicted immediate learning on KnoTS section 4: Generating a Thought for a Situation/Feeling (β = .002, df = 4, p = .04) and showed a nonsignificant trend to predict immediate learning on KnoTS section 7: Generating a Problem, Thought, Feeling, and Behavior (β =.055, df = 4, p = .07).

With regard to retained learning (i.e., follow-up), higher levels of metacognitive ability predicted Total CBT Knowledge scores at follow-up (β = .081, df = 4, p = .04), controlling for baseline KnoTS, age, and IQ. In addition, higher levels of metacognitive ability significantly predicted retention of learning on KnoTS section 7 (β = .053, df = 4, $p < .04$) and a nonsignificant trend emerged for KnoTS section 6 (β =.017, df = 4, $p < .08$).

Level of metacognitive ability did not increment the prediction of learning on KnoTS sections 5 and 6. For both of these sections, children's scores significantly increased from baseline, controlling for age and IQ (section 5: β = .231, df = 3, $p = .007$; section 6: β = .453, df = 3, $p < .000$). Children's learning immediately after training also was significant on the KnoTS Total score, controlling for baseline KnoTS, age, and IQ (β = .568, df = 3, $p < .000$).

With regard to retained learning about generating thoughts for situations/feelings (KnoTS section 4) and generating problems, thoughts, feelings, and behaviors (KnoTS section 5), metacognitive level did not significantly increment the prediction of learning over and above age, controlling for baseline metacognition and IQ. Children's scores on section 5 significantly increased from baseline, controlling for age and IQ (β = .122, df = 3, $p = .05$), but their scores on section 4 did not (β = -.013, df = 3, $p = .84$).

Secondary Questions

Metacognitive development and knowledge of CBT skills. Partial correlations, controlling for age and IQ, revealed that baseline knowledge of CBT skills and metacognition as measured by either the MCQ-C (r = .015; $p = .83$) or MUT (r = -.036; $p = .61$) were not significantly related.

Knowledge of CBT skills and psychopathology. Partial correlations, controlling for age and IQ, revealed that baseline knowledge of CBT skills was significantly and negatively related to depressive symptoms (CDI; r = -.155, $p = .025$), Anxiety Problems (YSR; r = -.164, $p = .018$) and Attention Problems (YSR; r = -.172, $p = .013$). Greater knowledge of CBT skills at baseline was associated with lower levels of depressive symptoms, anxiety problems, and attentions problems, controlling for age and IQ.

Metacognitive level and psychopathology. Partial correlations, controlling for age and IQ, revealed that metacognitive level was significantly and positively related to positive qualities (YSR; r = .231, *p* = .001) and obsessive-compulsive problems (YSR; r = .166, *p* = .016), and negatively related to depressive symptoms at the level of a nonsignificant trend (CDI; r = -.129, *p* = .062).

Homework and Learning CBT. Does completion of homework moderate the relation between children's level of metacognitive development and retention of learning of CBT skills? A linear regression was conducted, controlling for baseline KnoTS, age, and IQ, with the main effects of homework completion and metacognitive level (MCQ-C) entered in the first step, and the two-way interaction between homework completion and metacognition entered in the second step. The metacognition by homework completion interaction significantly predicted the KnoTS total score at follow-up (β =.19, df = 6, *p* =.03; see Figure 2). Simple slopes analyses revealed that at high levels of metacognitive development, the relation between homework completion and KnoTS Total Score at follow-up was significant (β = 2.07, df = 6, *p* = .003; see Figure 2), whereas at low levels of metacognitive development, the relation between homework completion and KnoTS Total Score at follow-up was not significant (β = -.151, df = 6, *p* = .837). The relation between metacognition and KnoTS Total Score at follow-up showed a nonsignificant trend both for those who did not complete the homework (β = .958, df = 6, *p* = .062) and for those who did complete the homework (β = -.958, df = 6, *p* = .062).

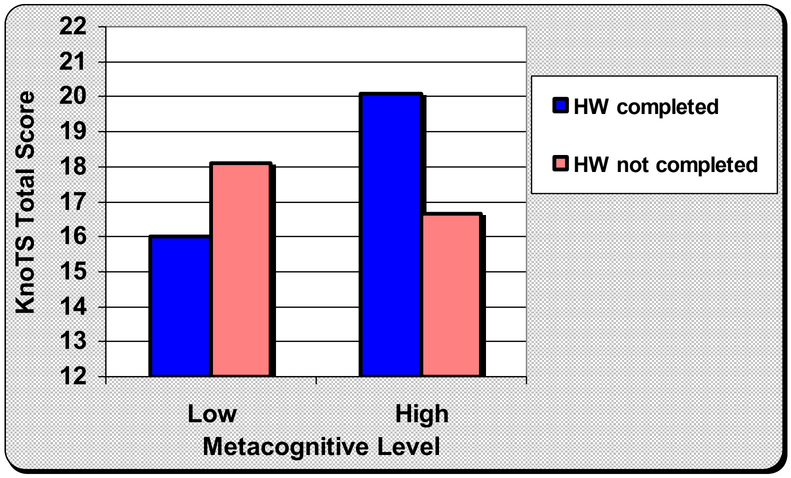

Figure 2. Moderation of Homework Completion

Does homework performance moderate the relation between children's level of metacognitive development and retention of learning of CBT skills? A linear regression was conducted, controlling for baseline KnoTS, age, and IQ, with the main effects of homework performance and metacognitive level on the MCQ-C entered in the first step, and the two-way interaction between homework performance and metacognition entered in the second step. The metacognition by homework performance interaction did not significantly predict the KnoTS Total Score at follow-up (β =.00, df = 6, p =.865).

Does performance on the homework assignments mediate the relation between metacognitive development and the extent of retention of learning of the CBT skills? As reported above, the relation between metacognitive level and retention of learning at follow-up was significant for the Total KnoTS score; β = .081, df = 4, p = .04), and KnoTS section 7 (β = .053, df = 4, p < .04). To examine whether homework performance mediated these relations, we followed the steps outlined by Baron and Kenny (1986). The linear regression analysis testing whether metacognition predicted homework performance was not significant ($\beta = .026$, df = 4, $p = .903$). Therefore no further examination of mediation was conducted.

CHAPTER IV

DISCUSSION

Primary Questions

The primary purpose of the present study was to determine whether children's level of cognitive development, specifically metacognition, significantly predicted their learning of the skills taught in cognitive behavior therapy (CBT), and if so, if metacognition incremented the prediction of learning over and above age. Results indicated that higher level of metacognitive ability as measured with the MCQ-C predicted a significant increment in children's knowledge of CBT skills over and above baseline knowledge, age, and IQ. In particular, higher metacognitive abilities significantly predicted learning to generate thoughts when given a situation and a feeling. This skill included the ability to have the thought they generated connect to the situation and feeling presented (KnoTS section 4).

Higher levels of metacognition also were significantly associated with learning to generate a personal problem, a negative thought, feeling, and behavior and also a counter to the negative thought, feeling, and behavior for the same problem (KnoTS section 7). This section of the KnoTS was the most cognitively demanding in that it required the generation of all pieces (problem situations, thoughts, feelings, behaviors), their connections, the knowledge of what is an "always bad thought." (i.e., a cognitive distortion), and the knowledge of how to cognitive restructure that thought to one that is more realistic and accurate (i.e., "not always bad thought"). This was a particularly difficult task that required combining the skills they had just learned, and drew upon their metacognitive abilities to think about multiple facets of the core CBT strategies.

With regard to retention of learning assessed at the follow-up, higher levels of metacognitive development predicted higher Total Scores on the KnoTS a week later, over and above age, IQ, and baseline KnoTS scores. Thus, metacognitive ability appears to facilitate learning of CBT skills such as identifying thoughts, feelings, and behaviors, cognitive restructuring, cognitive distortions, and finding evidence for and against thoughts.

On KnoTS section 5 (generating problem situation, thoughts, feelings, and behaviors) and section 6 (generating negative thoughts, feelings, and behaviors), significant learning occurred from pre- to post-training, but metacognitive ability did not increment this knowledge over and above age. This result is somewhat surprising given that the tasks involved in sections 5 and 6 together are what comprise section 7, which was incremented by metacognitive ability (Table 1 describes each section of the KnoTS). Similarly, retained learning occurred for KnoTS section 5, but level of metacognitive ability did not increment the prediction of this learning beyond age. Perhaps the items comprising section 5 were not cognitively demanding enough for level of metacognition to matter, as only one thought is generated in this section whereas multiple thoughts are generated for section 7.

Taken together, both immediate post-training and retained knowledge of CBT skills as assessed by the KnoTS were in part related to metacognitive ability. This is the first study to actually demonstrate that metacognitive level incremented learning over and above age and IQ. Thus, assessing children's metacognitive skills may help clinicians to better tailor interventions to a child's specific cognitive developmental level rather than relying on age alone. Children with higher levels of metacognitive ability may learn these CBT skills more easily. Whether or not developmental level also is related to children's likelihood of actually applying this knowledge in everyday situations remains to be addressed.

Secondary Questions

Homework and Learning CBT. The relation between homework completion and retention of learning at follow-up was moderated by metacognition. Among participants with low levels of metacognitive ability, homework completion was not significantly related to amount of knowledge of CBT skills that was retained. In contrast, among youth with high levels of metacognitive ability, completion of the homework assignment significantly predicted retention of learning as measured by the KnoTS at follow-up. Thus, for children with more advanced levels of metacognitive ability, practicing the skills over time may facilitate consolidation and retention of those skills.

Metacognitive ability is a complex skill that "plays an important role in oral communication of information, oral persuasion, oral comprehension, reading comprehension, writing, language acquisition, attention, memory, problem solving, social cognition, and various types of self-control and self-instruction" (Flavell, 19879 p.1). We cannot determine, however, which aspect(s) of metacognition were most relevant to homework completion. Perhaps higher metacognitive ability assisted in not only filling out the content-related homework questions, but it also may have facilitated (a) remembering to take homework home, (b) setting aside time to complete the homework, and (c) remembering to bring the homework to the follow-up session.

The moderator finding may reflect the "rich getting richer" in that those with higher levels of metacognitive ability were more likely to do their homework (i.e., possibly due to proper planning and memory), and then actually doing the homework helped with retaining the knowledge of CBT skills. Consistent with this finding of individual differences in the benefits of homework completion, previous research has shown that factors such as willingness and ability to complete homework, types of homework assigned, type of mental health condition, and the therapist-patient relationship may affect whether homework is understood and completed (Dozois 2010). One practical implication of this moderation finding is that it may be useful for clinicians to assess children's metacognitive level when determining whether or not to assign homework for a particular child. If homework may not be helpful for a child, knowing so ahead of time would save considerable time and energy on the part of both the child and clinician.

Homework *performance*, as distinct from completion, did not moderate or mediate the relation between metacognition and learning. It may be that how well the child does the homework, may be less critical than that he or she engages with the therapeutic material at all, which may be sufficient to reiterate and consolidate learning in such a way that can be recalled when needed.

Baseline Relations among Metacognition, Symptoms, and Knowledge. We also examined the relations among metacognition, symptoms, and knowledge of CBT skills, prior to the intervention. Initial knowledge of CBT skills was associated with lower levels of depressive symptoms, anxiety problems, and attention problems. The direction of this relation cannot be determined from these cross-sectional data. Perhaps having less knowledge about the skills taught in CBT contributes to, exacerbates, or maintains symptoms of anxiety and depression. Conversely, having symptoms of anxiety or depression may interfere with one's ability to use the CBT skills. Finally, some third variable not assessed here (e.g., genes, stress) might account for both children's level of symptoms and CBT skills. Controlling for IQ allowed us to rule out that the strength of this relation was simply accounted for by intelligence.

Second, higher levels of metacognitive ability were associated with more obsessive-compulsive problems. This finding is consistent with the fact that the MCQ-C was developed and validated in a sample of 7-17 year old youth with anxiety disorders, and the cognitive monitoring subscale has been found to correlate significantly with the Penn State Worry Questionnaire for Children. In contrast, we found that metacognitive level was associated with lower levels of depressive symptoms. Thus, contrary to the suggestion that being aware of one's thoughts is linked to internalizing disorders in general (Wells, 2009), metacognitive ability had a different relation to anxious versus depressive symptoms.

Interestingly, higher levels of metacognition also were associated with more positive qualities on the YSR. The positive qualities scale includes items about trying new things, taking life easy, trying to help others, trying to be fair, and being friendly. Thus, the ability to reflect upon one's own thoughts may be a step toward the development of perspective taking, empathy, and self-regulation.

Taken together, the finding that higher levels of metacognition were associated both with more anxiety and more positive qualities raises questions about the nature of metacognition and its measurement. Is metacognition as measured here best characterized as healthy introspection or as maladaptive rumination? According to "metacognitive theory (MCT) of psychological disorders" (Wells, 2000), metacognition is responsible for healthy and unhealthy control of the mind, and dysfunctional metacognition leads to worry and rumination, which for some can result in psychological disorders. In a sample of adults, Yilmaz and colleagues (2011) found that negative metacognitive beliefs about the uncontrollability and danger of worry predicted anxiety and depression. Wells (2009) asserted that metacognition "shapes what we pay attention to and the factors that enter consciousness. It also shapes appraisals and influences the types of strategies that we use to regulate thoughts and feelings" (p. 2). Wells developed Metacognitive Therapy (MCT), which aims to help people develop new ways to control attention and relate to negative thoughts by modifying metacognitive beliefs that contribute to unhealthy thinking patterns, and has been recommended for the treatment of anxiety, depression, and ADHD (Wells, 2011; Miller, 2012). Future randomized clinical trials should compare MCT to other therapies (e.g., CBT) and usual care in adults as well as in youth with anxiety and depressive disorders. If indeed level of metacognitive development predicts learning of CBT in children, then it would be interesting to know if improving metacognitive ability first would hasten the uptake of CBT skills.

The current study also examined the relation between metacognition and age. Bacow and colleagues (2009) found that awareness of thoughts increased with age in an anxious population. In the current study, however, metacognition was not significantly related to age, but was modestly though significantly correlated with grade, controlling for age and IQ ($r=.16$, $p=.024$). Teachers typically provide training in some aspects of metacognition such as how to comprehend what you read, how to find errors in your math work, and how to plan ahead for studying. Children with more years of formal education may have their metacognition "muscle" exercised more than those with fewer years of experience.

The relation between metacognitive level and baseline knowledge of CBT skills was not significant. Metacognitive level, however, did significantly predict *learning* of CBT skills. Previous studies have demonstrated that metacognition plays a role in learning academic subjects such as reading and math (Pressley & Afflerbach, 1995). Thus, metacognitive ability may be important for learning in general and not simply for acquiring CBT skills. Future studies should explore the relation of metacognitive level and learning other skill-based therapies (e.g., dialectical behavior therapy, problem-solving therapy).

Implications and Future Directions

Age-related differences in treatment response have been documented (Furman, 1980). What is it about age that is related to treatment efficacy? To address this question, we examined children's cognitive development, specifically metacognition, as one factor that may be associated with children's ability to understand and implement the skills taught in cognitive therapy. Indeed, we found that metacognitive level predicted learning of CBT skills, over and above age and IQ. What are the practical implications of these results in terms of the design and implementation of interventions with youth? Once clinicians have assessed this facet of cognitive development prior to treatment, several directions are possible: (1) alter the intervention to match the child's level of metacognition, (2) alter the child's level of metacognition first before implementing the intervention, or (3) some combination of these approaches in an iterative fashion.

One general way to developmentally tailor the intervention for those with low levels of metacognition would be to conduct a more behavioral intervention rather than a cognitively demanding one. This practice of focusing on behavior rather than cognitions is already widely used by clinicians, particularly with young patients (Bailey, 2001). In such cases, the child's age and symptoms, which tend to be more behavioral in nature (e.g., noncompliance at home, disruptive in classroom), typically guide treatment planning. Bailey (2001) stated that, "Particular adaptations that therapists make in working with children are to do with pacing the content and speed of therapy at a level appropriate for the child, bearing in mind the younger child's limitations in *metacognition* and ineptitude in labeling feelings. With younger children, the therapist is likely to be more active and will make use of a higher proportion of behavioural to cognitive techniques" (p. 224, italics mine).

The results of the current study are consistent with Bailey's (2001) recognition of metacognition as an important developmental ability to consider in treatment tailoring. The current study provides an empirically driven step toward individualization of therapy by highlighting the importance of children's level of metacognition to the learning of specific CBT skills. The parts of the KnoTS that did not involve metacognition as a predictor of learning were section 1, which required children to identify situations, thoughts, and behaviors, and the multiple-choice questions (section 2), where the information was provided and selection was required, making it easier for those with lower levels of metacognition. In contrast, sections 4 through 7 were more cognitively demanding and required children to generate situations, thoughts, feelings, and behaviors. Thus, one implication is that for children with lower levels of metacognition, therapeutic activities should be choice oriented (e.g., identification games, training with multiple choices already formulated). One value of this treatment strategy is that it doesn't necessitate a purely behavioral approach; rather, cognitions and thoughts can be discussed and included, although in an easier format. Success of a selection rather than generative approach towards teaching the cognitive aspect of CBT for those with lower levels of metacognition is worthy of further empirical examination.

A second approach to using information about a child's level of cognitive development in treatment planning would be to intervene directly on strengthening the child's levels of cognitive development (e.g., metacognition) relevant to their acquiring the cognitive skills taught in therapy. That is, by first bolstering children's metacognitive ability, they become better able to engage in more cognitively demanding interventions such as CBT.

Metacognition typically has been studied as a skill key to children's academic learning, and is itself a skill that can be taught. Within a school context, teachers increase their students' metacognition by modeling strategies in context (e.g., while reading or computing math problems) followed by independent practice and feedback (Schraw, 1998). Strategies modeled include asking questions such as "How do you know if you understand or don't understand something that you read?" and "When might you decide to reread the text?" For example, Huff and Nietfeld (2009) taught fifth graders how to self-monitor their reading comprehension and found improvement after two weeks of training, as defined as one's on-line awareness of comprehension and task performance. Additionally, training in metacognition that included learning how the mind works, the importance of working slowly, and matching study and retrieval strategies improved the ability of fourth to sixth graders to summarize a reading passage (Kurtz & Borkowski, 1987). Notably, this training was found to improve metacognitive ability in children categorized as either impulsive or reflective prior to training. Thus, evidence exists that metacognition can be trained in school-aged children.

Many questions remain, however, about the implementation and design of such training intended to improve metacognition including: What would the training components be for "thinking about thinking?" How long does the training need to be (number of sessions and duration)? Who would best implement the training? And importantly, does training in metacognition for those with deficits in this area lead to increased learning of the therapeutic skills taught in a cognitively demanding intervention?

Related evidence about the utility of cognitive training is available from the child development literature on executive functioning (EF). EF refers to "a set of general-purpose control mechanisms, often linked to the prefrontal cortex of the brain, that regulate the dynamics of human cognitive and action" (p. 8, Miyake & Friedman, 2012); this includes processes such as cognitive flexibility, inhibitory control, and working memory. Developmental psychologists are investigating how youth's executive functioning skills can be bolstered through direct training (e.g., Miyake & Friedman, 2012; Zelazo, 2013). Interventions aimed at improving EF require self-reflective, focused attention and involve adaptive challenges, repetition, and practice as neurocognitive development is a "dynamic process of adaptation wherein neural systems are constructed (by the child) in a use-dependent fashion" (p. 2, Zelazo, 2013). Cognitive training in working memory, inhibition, and task switching is often task specific, and therefore may not generalize to new situations (Kray & Ferdinand, 2013). Nevertheless, the potential benefits of direct cognitive training on the young adaptive brain for academic and everyday functioning are compelling. Future research should examine if the findings in the arena of EF have parallel implications for training metacognitive skills as well.

Another possible avenue for successfully bolstering the children's metacognitive awareness may be mindfulness. Zelazo and Lyons (2012) posited that mindfulness training with age-appropriate activities that exercise children's reflection on their moment-to-moment experiences might support the development of self-regulation. Mindfulness can facilitate executive functions and modulate anxiety, stress, and arousal to foster conditions conducive to self-reflection. As the neural networks underlying reflection are shaped by experience and strengthened with practice (Stiles, 2008), mindfulness (Segal, Williams, & Teasdale, 2013) may exercise the neural networks (e.g., lateral PFC, insula, medial PFC) necessary for metacognition (Craig, 2009). Zelazo and Lyons (2012) further suggested that teachers, parents, and caregivers can model mindfulness that is age-appropriate for children, such as learning to attend to physical sensations and building up to more complex internal processes such as thoughts or emotions. Consistent with this, children's self-reported mindfulness awareness has been found to positively correlate with their EF skills (Oberle et al., 2012). How metacognition specifically is related to mindfulness and EF, the ability to train all three of these skills in children, and their relation to learning therapeutic Skills is an important direction for future studies.

Assessment Tools: Metacognition and the KnoTS. Whether we choose to alter the intervention, alter the child's metacognitive level, or some combination of the two, we first need a valid and reliable assessment of children's metacognition. The term metacognition can refer to numerous skills. The current study focused on cognitive monitoring or the ability to think about one's own thinking, and therefore we utilized the MCQ-C Child Monitoring subscale. However, this scale is only comprised of six items. Moreover, the MCQ-C is self-report and hence may require metacognition to be able to complete it, hindering the ability to measure the construct of interest.

The other measure of metacognition used was the MUT, but it did not significantly predict learning in the current study, and the MUT and MCQ-C were significantly negatively correlated (see Appendix, Table 3). Perhaps the two measures captured different aspects of understanding cognitive phenomena, such that the MUT ascertained children's comprehension of the uncontrollable nature of thoughts and the MCQ-C assessed children's awareness of their own thinking. The development of cognitive-monitoring, reflection specific metacognition assessments that are valid and reliable across a large age range would assist in our understanding of this cognitive development and its accurate measurement.

Additionally, to assess change in knowledge of CBT skills, we developed the KnoTS. Four equivalent forms were counterbalanced across assessments points. Youth's knowledge of CBT skills increased significantly more for children who participated in the teaching session than for those who completed assessment measures first, indicating that the KnoTS is sensitive to change in learning of CBT skills. This measure can be used in clinical settings to assess children's baseline knowledge about CBT. Future research is needed to further refine and validate this measure. Extending it to therapeutic skills beyond the cognitive core of CBT also may be useful to clinicians. A new measure of adult patients' comprehension and use of cognitive therapy, the Skills of Cognitive Therapy (SoCT; Jarrett, Vittengl, Clark, & Thase, 2011) was developed recently and may be a helpful model as we continue to refine the KnoTS for use with children and adolescents.

Strengths and Limitations

The current study attempted to assess learning of therapeutic skills in an isolated teaching session. Although we assigned homework to make this protocol more ecologically valid, we did not assess learning across a series of therapy sessions, as typically would be more similar to outpatient therapy. As such, the learning assessed in this study may differ from learning that occurs across multiple therapy sessions.

No formal measures of children's knowledge of CBT skills currently existed prior to our development of the KnoTS. As a result, we created a measure for this study (i.e., KnoTS). The KnoTS was sensitive to detecting change in children's knowledge about CBT skills. Given that this was a new measure, further tests of its validity and reliability is warranted.

Finally, this study examined metacognition, an important developmental ability that likely is necessary for effective engagement in therapy, in a community sample of youth ages 9-16. Going forward, it will be important to expand the underlying main question of this research to (a) other developmental or executive functioning domains (e.g., social and emotional, cognitive flexibility, working memory), and (b) other populations [e.g., individuals with developmental disabilities (e.g., Lickel, 2010), current psychopathology, adults, elderly]. That is, when aiming to create individualized, efficacious treatments for depression, what role does an area of development or EF play and for whom in learning skills that increase well-being and functioning and decrease symptoms? The current study, in combining the typically insular fields of developmental and clinical psychology, is a step in this direction.

Significance

For decades, researchers have discussed the importance of cognitive development for effectively intervening in the lives of children and adolescents (Grave & Blissett, 2004; Holmbeck & Kendall, 1991; Shirk, 1999). As Loper (1980) stated over 30 years ago:

> Children's understanding of metacognition, or their growing awareness of their own thought processes, should be of prime importance to the practitioner engaged in cognitive training. The success or failure of a cognitive training approach may well depend on the children's capacity for awareness of what they are doing. (p. 7)

The current study is the first to our knowledge to empirically investigate the relation between cognitive development, specifically metacognition, and children's ability to learn CBT skills. Further, this study introduced a new measure of therapeutic knowledge, which is a unique contribution to the field. In addition, no previous research has assessed children's development, separate from age, as a potential factor predicting children's ability to learn therapeutic skills. Further, this study found a significant relation between metacognition, children's learning, and homework completion, and thus provides valuable information that could ultimately be used to guide clinicians in their treatment planning, thereby improving the efficacy and efficiency of therapeutic interventions for youth.

Finally, this study provides important insights into the relations among development, symptoms of psychopathology, and knowledge of CBT skills. Given the prevalence of and impairment associated with pediatric depression, improving treatment outcomes for youth is of critical importance. This study is an important step toward better understanding the limitations of our current treatment approaches and moving toward more effective individualized treatment planning.

REFERENCES

Abela, J. R. Z., & Hankin, B. L. (2011). Rumination as a vulnerability factor to depression during the transition from early to middle adolescence: A multiwave longitudinal study. *Journal of Abnormal Psychology, 120*(2), 259-271.

Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the ASEBA school-age forms & profiles*. Burlington, VT: University of Vermont, Research Center for Children, Youth and Families.

Bacow, T. L., Pincus, D. B., Ehrenreich, J. T., & Brody, L. R. (2009). The metacognitions questionnaire for children: development and validation in a clinical sample of children and adolescents with anxiety disorders. *Journal of Anxiety Disorders, 23*, 727-736. doi: 10.1016/j.janxdis.2009.02.013

Bailey, V. (2001). Cognitive-behavioural therapies for children and adolescents. *Advances in Psychiatric Treatment, 7,* 224-232. doi: 10.1192/apt.7.3.224

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173-1182.

Barquero, B., Robinson, E. J., & Thomas, G. V. (2003). Children's ability to attribute different interpretations of ambiguous drawings to a naive vs. a biased observer *International Journal of Behavioral Development, 27*(5), 445-456. doi: 10.1080/01650250344000064

Bell, N. J., Wieling, E., & Watson, W. (2004). Self-reflecting in developmental context: Variations in level and patterning during the first two university years. *The Journal of Genetic Psychology, 165*(4), 451-465.

Birmaher, B., Khetarpal, S., Brent, D., Cully, M., Balach, L., Kaufman, J., & Neer, S. (1997). The screen for child anxiety related emotional disorders (SCARED): Scale construction and psychometric characteristics. *Journal of the American Academy of Child and Adolescent Psychiatry, 36*(4), 545-553.

Birmaher, B., Ryan, N. D., Williamson, D. E., Brent, D. A., Kaufman, J., Dahl, R. E., & Perel, J. (1996). Childhood and adolescent depression: a review of the past 10 years. Part I. *Journal of the American Academy of Child and Adolescent Psychiatry, 35*(11), 1427-1439. doi: 10.1097/00004583-199611000-00011

Cartwright-Hatton, S., Mather, A., Illingworth, V., Brocki, J., Harrington, R., & Wells, A. (2004). Development and preliminary validation of the Meta-cognitions Questionnaire - Adolescent Version. *Anxiety Disorders, 18*, 411-422. doi: 10.1016/S0887-6185(02)00294-3

Chaplin, T. M., Gillham, J. E., Reivich, K., Elkon, A. G. L., Samuels, B., Freres, D. R., . . . Seligman, M. E. (2006). Depression prevention for early adolescent girls: A pilot study of all-girls versus co-ed groups. *Journal of Early Adolescence, 26*(110-126).

Craig, A.D. (2009). How do you feel --- now? The anterior insula and human awareness. *Nature Reviews Neuroscience, 10*(1), 59-70.

Doherr, L., Reynolds, S., Wetherly, J., & Evans, E. H. (2005). Young children's ability to engage in cognitive therapy tasks: Associations with age and educational experience. *Behavioural and Cognitive Psychotherapy, 33*, 201-215.

Dozois, D. J. A. (2010). Understanding and enhancing the effects of homework in cognitive-behavioral therapy. *Clinical Psychology: Science and Practice, 17*(2), 157-161. doi:http://dx.doi.org/10.1111/j.1468-2850.2010.01205.x

Durlak, J. A., Furhman, T., & Lampman, C. (1991). Effectiveness of cognitive-behavior therapy for maladapting children: A meta-analysis. *Psychological bulletin, 110*(2), 204-214. doi: 0022-2909/91

Durlak, J. A., & McGlinchey, K. A. (1999). Child therapy outcome research: Current status and some future priorities. In S. W. Russ & T. H. Ollendick (Eds.), *Handbook of psychotherapies with children and families* (pp. 525-539). Dordrecht, Netherlands: Kluwer Academic Publishers.

Espinet, S.D., Anderson, J.E., & Zelazo, P.D. (in press). Reflection training improves executive function in preschool-age children: Behavioral and neural effects. *Developmental Cognitive Neuroscience.* doi: 10.1016/j.dcn.2012.11.009

Eyberg, S. M., Schuhmann, E. M., & Rey, J. (1998). Child and adolescent psychotherapy research: Developmental issues. *Journal of Abnormal Child Psychology, 26*(1), 71-82. doi: 10.1023/A:1022686823936

Flavell, J. H. (1971). First discussant's comments: What is memory development the development of? . *Human Development, 14*, 272-278.

Flavell, J. H. (1979). Metacognition and Cognitive Monitoring: A New Area of Cognitive-Developmental Inquiry. *American Psychologist, 34*(10), 906-911. doi: 0003-066X/79/3410-0906

Flavell, J. H. (1999). Cognitive Development: Children's knowledge about the mind. *Annual Review of Psychology, 50*, 21-45. doi: 0084-6570/98/0201-0021

Flavell, J. H., Flavell, E. R., & Green, F. L. (1987). Young children's knowledge about the apparent-real and pretend-real distinctions. *Developmental Psychology, 23*(6), 816-822. doi: 10.1037/0012-1649.23.6.816

Flavell, J. H., Flavell, E. R., & Green, F. L. (2001). Development of children's understanding of connections between thinking and feeling. *Psychological Science, 12*(5), 430-432. doi: 10.1111/1467-9280.00379

Flavell, J. H., Green, F. L., & Flavell, E. R. (1993). Children's understanding of stream of consciousness. *Child Development, 64*(2), 387-398. doi: 0009-3920/93/6402-001

Flavell, J. H., Green, F. L., & Flavell, E. R. (1998). The mind has a mind of its own: Developing knowledge about mental uncontrollability. *Cognitive Development, 13*(1), 127-138. doi: 10.1016/S0885-2014(98)90024-7

Flavell, J. H., Green, F. L., & Flavell, E. R. (2000). Development of children's awareness of their own thoughts. *Journal of Cognition and Development, 1*, 97-112. doi: 10.1207/S15327647JCD0101N_10

Flavell, J. H., Green, F. L., Flavell, E. R., & Grossman, J. B. (1997). Development of Children's Knowledge About Inner Speech. *Child Development, 68*(1), 39-47.

Furman, W. (1980). Promoting social development: Developmental implications for social learning approaches. In B. B. Lahey & A. E. Kazdin (Eds.), *Advances in clinical child psychology*. New York: Plenum.

Gillham, J. E., & Reivich, K. J. (1999). Prevention of depressive symtpoms in school children: A research update. *Psychological Science, 10*, 461-462.

Gillham, J. E., Reivich, K. J., Freres, D. R., Chaplin, T. M., Shatte, A. J., Samuels, B., . . . Seligman, M. E. (2007). School-based prevention of depressive symptoms: A randomized controlled study of the effectiveness and specificity of the Penn Resiliency Program. *Journal of Consulting and Clinical Psychology, 75*, 9-19.

Grave, J., & Blissett, J. (2004). Is cognitive behavior therapy developmentally appropriate for young children? A critical review of the evidence. *Clinical Psychology Review, 24*, 399-420. doi: 10.1016/j.cpr.2004.03.002

Harrington, R.C., Wood, A., & Verduyn, C. (1998). Clinically depressed adolescents. In P. Graham (Ed.), *Cognitive-behaviour therapy for children and families* (pp. 156-193).

Harrington, R. C. (2005). Depressive disorders. In P. J. Graham (Ed.), *Cognitive behavior therapy for children and families* (2nd ed., pp. 263-280). Cambridge, England: Cambridge University Press.

Herrington, C. G., & Frankel, S. A. (2011). *Knowledge of Therapeutic Skills (KnoTS)*. Unpublished assessment.

Holmbeck, G. N., & Kendall, P. C. (1991). Clinical-childhood-developmental interface: Implications for treatment. In P. R. Martin (Ed.), *Handbook of behavior therapy and psychological science: An integrative approach* (pp. 73-99). Elmsford, NY: Pergamon Press.

Holmbeck, G. N., O'Mahar, K., Abad, M., Colder, C., & Updegrove, A. (2006). Cognitive-behavioral therapy with adolescents: Guides from developmental psychology. In P. C. Kendall (Ed.), *Child and adolescent therapy: Cognitive-behavioral procedures* (3rd ed., pp. 419-464). New York: Guilford Press.

Huff, J.D. & Nietfeld, J.L. (2009). Using strategy instruction and confidence judgments to improve metacognitive monitoring. *Metacognition Learning, 4,* 161-176. doi: 10.1007/s11409-009-9042-8

Jarrett, R. B., Vittengl, J. R., Clark, L. A., & Thase, M. E. (2011). Skills of cognitive therapy (SoCT): A new measure of patients' comprehension and use. *Psychological Assessment, 23*(3), 578-586. doi:http://dx.doi.org/10.1037/a0022485

Jaycox, L. H., Reivich, K. J., Gillham, J., & Seligman, M. E. (1994). Prevention of depressive symptoms in school children. *Behaviour research and therapy, 32*(8), 801-816.

Kazantzis, N., Whittington, C., Dattilio, F. (2010). Meta-analysis of homework effects in cognitive behavioral therapy: A replication and extension. *Clinical Psychology Science and Practice, 17,* 144-156.

Kinney, A. (1991). Cognitive-behavior therapy with children: Developmental reconsiderations. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 9*(1), 51-61.

Kovacs, M. (1992). *Children's depression inventory manual* North Tonawanda, NY: Multi Health Systems, Inc.

Kray, J. & Ferdinand, N.K. (2013). How to improve cognitive control in development during childhood: Potentials and limits of cognitive interventions. *Child Development Perspectives, 7*(2), 121-135. doi: 10.1111/cdep.12027

Kurtz, B.E. & Borkowski, J.G. (1987). Development of strategic skills in impulsive and reflective children: A longitudinal study of metacognition. *Journal of Experimental Child Psychology, 43,* 129-148.

Lickel, A. (2010). *Assessment of the prerequisite skills for cognitive behavioral therapy in children with and without autism spectrum disorders.* University of Wyoming). *ProQuest Dissertations and Theses,* 80. Retrieved from http://search.proquest.com.proxy.library.vanderbilt.edu/docview/763606739?accountid=14816. (763606739).

Loper, A.B. (1980). Metacognitive development: Implications for cognitive training. *Exceptional eduation quarterly*, 1-8.

McCrae, R.R. & John, O.P. (1992). An introduction to the five-factor model and its applications. *Journal of Personality, 60*(2), 185-215. doi: 10.1111/j.1467-6494.1991.tb00970.x

Miller, M.C. (2012). Metacognitive therapy: a possible new approach for ADHD? Mental Health Publishing, Harvard Health Publications. www.health/harvard.edu/

Miyake, A & Friedman, N.P. (2012). The nature and organization of individual differences in executive fucntions: four general conclusions. *Current Directions in Psychological Science, 21*(8), 8-14. doi: 10.1177/0963721411429458

Oberle, E., Schonert-Reichl, K.A., Lawlor, M.S., & Thomson, K.C. (2012). Mindfulness and inhibitory control in early adolescence. *The Journal of Early Adolescence, 32*(4) 565-588 doi: 10.1177/0272431611403741

Ollendick, T. H., Grills, A. E., & King, N. J. (2001). Applying developmental theory to the assessment and treatment of childhood disorders: Does it make a difference? *Clinical Psychology and Psychotherapy, 8*, 304-314.

Ormond, C., Luszcz, M. A., Mann, L., & Beswick, G. (1991). A metacognitive analysis of decision making in adolescence. *Journal of Adolescence, 14*, 275-291. doi: 0140-1971/91/030275

Pillow, B. H., & Henrichon, A. J. (1996). There's more to the picture than meets the eye: Young children's difficulty understanding biased interpretation *Child Development, 67*(3), 803-819. doi: 10.2307/1131862

Pressley, M. & Afflerbach, P. (1995). Verbal protocols of reading: The nature of constructively responsive reading. Hillsdale, NJ, England: Lawrence Erlbaum Associates, Inc.

Quakley, S., Reynolds, S., & Coker, S. (2004). The effect of cues on young children's abilities to discriminate among thoughts, feelings, and behaviors. *Behaviour Research and Therapy, 42*, 343-356. doi: 10.1016/S0005-7967(03)00145-1

Remmel, E., & Flavell, J. H. (2004). Recent progress in cognitive developmental research: Implications for clinical practice. In H. Steiner (Ed.), *Hanbook of mental health interventions in children and adolescents: An integrated developmental approach* (pp. 73-97). San Francisco, CA: Jossey-Bass.

Sauter, F. M., Heyne, D., & Westenberg, P. M. (2009). Cognitive behavior therapy for anxious adolescents: Developmental influences on treatment design and delivery. *Clinical child and family psychology review, 12*, 310-335. doi: 10.1007/s10567-009-0058-z

Segal, Z.V., Williams, J.M.G., & Teasdale, J.D. (2013). Mindfulness-Based Cognitive Therapy for Depression: Second Edition. New York: The Guilford Press.

Schneider, W., & Lockl, K. (2002). The development of metacognitive knowledge in children and adolescents. In T. J. Perfect & B. L. Schwartz (Eds.), *Applied metacognition* (pp. 224-257). New York, NY: Cambridge University Press.

Schraw, G. (1998). Promoting general metacognitive awareness. *Instructional Science, 26,* 113-125. doi: 10.1023/A:1003044231033

Shirk, S. (1988). *Cognitive development and child psychotherapy*. New York: Plenum Press.

Shirk, S. (1999). Developmental therapy. In W. K. Silverman & T. H. Ollendick (Eds.), *Developmental issues in the clinical treatment of children* (pp. 60-73). Needham Heights, MA: Allyn & Bacon.

Siqueland, L., Rynn, M., & Diamond, G. S. (2005). Cognitive behavioral and attachment based family therapy for anxious adolescents: Phase I and II studies. *Journal of anxiety disorders, 19*(4), 361-381. doi: 10.1016/j.janxdis.2004.04.006

Stallard, P. (2002). Cognitive behavior therapy with children and young people: A selective review of key issues. *Behavioural and Cognitive Psychotherapy, 30*(3), 297-309. doi: 10.1017/S1352465802003053

Stallard, P. (2009). Cognitive behavior therapy with children and young people. In H. Beinart, P. Kennedy & S. Llewelyn (Eds.), *Clinical psychology in practice* (pp. 117 - 126). Leicester, England: Blackwell Publishing.

Steiner, H. (2004). *Handbook of mental health interventions in children and adolescents: An integrated developmental approach*. San Francisco: Jossey-Bass.

Stiles, J. (2008). The fundamentals of brain development: Integrating nature and nuture. Cambridge, MA: Harvard University Press.

Vasey, M. W. (1993). Development and cognition in childhood anxiety: The example of worry. In T. H. Ollendick & R. J. Prinz (Eds.), *Advances in clinical child psychology* (pp. 1-39). New York: Plenum Press.

Weisz, J. R., McCarty, C. A., & Valeri, S. M. (2006). Effects of psychotherapy for depression in children and adolescents: A meta-analysis. *Psychological Bulletin, 132*(1), 132-149. doi: 10.1037/0033-2909.132.1.132

Weisz, J. R., Weiss, B., Alicke, M. D., & Klotz, M. L. (1987). Effectiveness of psychotherapy with children and adolescents: A meta-analysis for clinicians. *Journal of Consulting and Clinical Psychology, 55*(4), 542-549. doi: 0022-006X/87/500.75

Weisz, J. R., Weiss, B., Han, S. S., Granger, D. A., & Morton, T. (1995). Effects of psychotherapy with children and adolescents revisited: A meta-analysis of treatment outcome studies. *Psychological bulletin, 117*(3), 450-468. doi: 10.1037/0003-066X.60.6.628

Wellman, H. M. (1985). The origins of metacognition. In D. L. Forrest-Pressley, G. E. MacKinnon & T. G. Waller (Eds.), *Metacogntion, cognition, and human performance* (pp. 1-31).

Wells, A. (2009). Metacognitive therapy for anxiety and depression. New York: The Guilford Press.

Yilmaz, A.E., Gencoz, T., Wells, A. (2011). The temporal precedence of metacognition in the development of anxiety and depression symptoms in the context of life-stress: A prospective study. *Journal of Anxiety Disorders*, *25*, 389-396. doi: 10.1016/j.janxdiz.2010.11.001

Yu, D. L., & Seligman, M. E. (2002). Preventing depressive symptoms in Chinese children. *Prevention and Treatment, 5*, np.

Zelazo, P.D. Reflections on the development of executive function: Commentary on Knapp and Morton, Munakata et al., Rueda and Paz-Alonso, Benson and Sabbagh, Hook et al., and Blair. *Encyclopedia on Early Childhood Development* [online]. Montreal, Quebec: Centre of Excellene for Early Childhood Development and Strategic Knowledge Cluster on Early Child Development; 2013:1-7. Available at: http://www.child-encyclopedia.com/documents/ZelazoANGxpl.pdf. Accessed April 2013.

Zelazo, P.D. & Lyons, K.E. (2012). The potential benefits of mindfulness training in early childhood: A deveopmental social cognitive neuroscience perspective. *Child Development Perspectives, 6*(2), 154-160. doi: 10.1111/j.1750-8606.2012.00241.x

Appendix A. Table 3. Means, Standard Deviations, and Correlations of Independent and Dependent Variables

Variable	Mean	SD	1. age	2. grade	3. IQ	4. Sex	5. Minor	6. MCQ C	7. MUT	8. Pre KnoTs	9. HW	10. YSR Tot	11. YSR Int	12. YSR Ext	13. YSR PQ	14. CDI
1. Age	12.84	1.91	1													
2. Grade	6.92	1.94	.97***	1												
3. IQ	106.42	12.98	-.22***	-.21**	1											
4. Sex	.41	.49	-.03	-.02	-.12	1										
5. Minority status	.17	.38	-.02	-.02	-.15*	.07	1									
6. MCQ-C	23.01	5.82	.08	.13~	.01	-.02	.01	1								
7. MUT	9.81	2.46	-.02	-.01	.19**	.09	-.01	-.14*	1							
8. Preteach KnoTS	39.06	4.67	.19 **	.21**	.15*	.08	-.08	.09	.02	1						
9. HW	.69	.46	-.05	-.07	.17*	.03	-.08	.01	-.05	.09	1					
10. YSR Tot	42.30	21.32	.08	.07	.08	.11	.19**	.05	.20**	-.06	-.03	1				
11. YSR Int	12.03	8.01	-.05	-.05	.12	.21***	.15*	.05	.16**	-.03	.04	.86***	1			
12. YSR Ext	9.90	6.52	.28***	.25***	-.06	.01	.16*	.02	.16**	.01	-.14*	.75***	.41***	1		
13. YSR PQ	22.08	3.92	.05	.07	-.05	-.08	-.06	.21**	-.08	.06	-.02	-.04	-.12	-.04	1	
14. CDI	7.77	5.62	-.02	-.03	.10	.11	.16*	-.13~	.02	-.14**	.01	.63***	.59***	.39***	-.27***	1
15. SCARED	20.33	11.58	-.11	-.12	.13~	.22***	.09	.11	.08	.001	.15*	.69***	.80***	.31***	-.08	.44***

~$p < .06$; *$p < .05$; ** $p < .01$; ***$p < .001$

Note: Sex (0=male; 1=female); Minority Status (0=Not Minority; 1=Minority); IQ (Vocab & Block Design); MCQ-C = Metacognitions Questionnaire for Children; MUT = Mental Uncontrollability Task; Preteach KnoTS = Baseline knowledge of CT skills; HW = Homework Completion (0=no; 1=yes); YSR Tot = YSR Total Problems; YSR Int = YSR Internalizing; YSR Ext = YSR Externalizing; YSR PQ = YSR Positive Qualities; CDI = Child Depression Inventory; SCARED = Screen for Child Anxiety Related Emotional Disorders