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Evaluation of a Cognitive Training Program

Jenae Ulrich

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Evaluation of a Cognitive Training Program

by

Jenae Ulrich

Presented to the Faculty of the
Graduate School of Clinical Psychology
George Fox University
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of the requirements for the degree of
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Evaluation of a Cognitive Training Program

by

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has been approved at the

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Approval

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Evaluation of a Cognitive Training Program

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Abstract

Cognitive Training (CT) is beginning to receive a great amount of attention as a treatment option for children and adults who have sustained brain insults, have chronic conditions such as a learning disability, or have other types of cognitively-related difficulties. There are numerous peer-reviewed articles examining CT, and yet there is confusion about what CT is and whether it is effective. The model common to most forms of CT posits that by doing “mind exercises” one produces dendrite growth that eventually leads to improved collaborative functioning of neural pathways in the brain. This study evaluated the efficacy of a CT program that is commercially available in the US Northwest. The study gathered objective and subjective data to determine whether this CT program produces significant changes in domains of special program focus, specifically short-term memory, attention and concentration, self identity, subjective impressions of improvement, and academic performance. Thirty male and female participants between the ages of 7 and 17 years agreed to participate. A pre- vs. post-intervention design was used, with the “post” condition consisting of intermediate vs. extended intervention durations, allowing a dose-related analysis also to be conducted. Results indicated that no pre- vs. post-intervention effects were detected for the domains of short-term memory, attention and concentration, self identity, and academic performance. However an intervention effect was found with subjective impressions of improvement in memory and behavior. Therefore, overall, only a limited amount of impact resulted from the CT intervention.

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Chapter 1

Introduction

Background

Cognitive training (CT) is generally thought of as one or more remediation programs involving tasks that seek to improve various cognitive functions by clients completing a regimen of sequentially designed tasks requiring repeated practice (Beck, Hanson, Puffenberger, Benninger & Benninger, 2010; Bissig & Lustig, 2007; Boron, Turiano, Willis, & Schaie, 2007; Holmes & Gathercole, 2013; Klingberg et al., 2005; & Klingberg, Forssberg, & Wersterberg, 2005). Not surprisingly, the impact of CT programs has been the focus of considerable research by psychologists. Many investigations have evaluated whether such treatments improve cognitive functioning for a diverse group of individuals across the age span and many functioning levels by using a plethora of assessments and evaluation processes (Boron et al., 2007; Hyatt, 2007; Saczynski, Margrett, & Willis, 2004; Sitzler, Twamley, & Jeste, 2006; Spaulding, Mostert, & Beam, 2010; Unverzagt et al., 2009). These articles focused on the general population as well as specialized groups identified as having cognitive decline, TBI, ADHD, learning disabilities, etc. However, most of the research was unclear whether cognitive training has a lasting positive impact on cognitive functioning following the intervention (Bissig & Lustig, 2007; Brenk, Laun, & Haase, 2008; Farina et al., 2002; Farina et al., 2006; Hyatt, 2007; Mimura & Komatsu, 2007; Sitzler et al., 2006; Spaulding et al., 2010). Little research has focused on whether there is generalization of the program skill sets to “real world” performance.

In this paper, a challenge for evaluating whether CT programs are efficacious is the variability found across program intervention strategies. The program evaluated for this research included a CT program, which hypothesized that by doing “mind exercises” one produces dendrite growth that eventually leads to improved collaborative functioning of the mind and/or neural pathways in the brain. Much of the outcome research has been focused on potential positive impact in the aging population, most of whom experience normal, age-related decline in cognitive functions (Bissig & Lustig, 2007; Boron et al., 2007; Elias & Wagster, 2007; Farina et al., 2002; Farina et al., 2006; Hildebrandt et al., 2007; Kramer & Willis, 2002; Margrett & Willis, 2006; Mimura & Komatsu, 2007; Park et al., 2009; Saczynski et al., 2004; Sitzler et al., 2006; Unverzagt et al., 2009; Zelinski, 2009).

Taken overall, this research on persons older than 60, has shown in general that CT has positive effects (Bissig & Lustig, 2007; Boman, Lindstedt, Hemmingsson, & Bartfai, 2004; Boron et al., 2007; Farina et al., 2002; Farina et al., 2006; Margrett & Willis, 2006; Mimura & Komatsu, 2007; Park et al., 2009; Saczynski et al., 2004; Sitzler et al., 2006). Studies that focused on the aging population not experiencing cognitive decline found that inductive reasoning training brought about significant positive change in inductive reasoning skills following intervention (Boron et al., 2007; Margrett & Willis, 2006; & Saczynski et al., 2004). Margrett & Willis (2006) and Saczynski et al. (2004) compared groups that were individually and collaboratively trained in groups and found a positive significant change in inductive reasoning with no difference between group or individualized treatments.

Other studies focused on CT for the aging population with mild dementia and Alzheimer’s disease. Overall, findings reported a significant positive change in cognitive

functioning following CT utilizing procedural memory training and inductive reasoning training (Farina et al., 2002; Farina et al., 2006; Mimura & Komatsu, 2007; Sitzler et al., 2006). However, Farina et al. (2002) and Farina et al. (2006) found that participants regressed to their original functioning levels at a three- and six-month follow-up. Boman et al. (2004) studied the aging population with acquired brain injury and found that, following training, attention improvement was most pronounced but both attention and memory were significantly improved. It was suggested that attention has a carry-over effect on memory ability, which may be the cause of the memory improvement (Boman et al., 2004). In summation, CT with aging populations has shown a positive effect on memory, attention, and inductive reasoning. However, it appears that the improvements did not last among those with cognitive dysfunction and little is known regarding duration of intervention impact with the aging population without cognitive dysfunction.

Efficacy of cognitive interventions used with school-aged children are not as numerous and are much less specific regarding the training programs used and their generalizability to real world experiences (Hyatt, 2007; Spaulding et al., 2010; Van't Hooft et al., 2007). Less than 50 articles were found when researching CT with American children and adolescents from 1970 to mid-2011 using a search in PsychInfo. However, despite the lack of scientific research demonstrating positive CT effects on school performance, many parents continue to invest in these interventions for children experiencing low academic achievement (Brighter Minds, 2009; Holt, 2006; Hyatt, 2007; Spaulding et al., 2010).

Cogmed Training

One of the most empirically supported CT programs for children is known as Cogmed, a purportedly evidence-based program for improving working memory. Cogmed became a commercial product of Pearson Assessments in 2010. Cogmed claims its positive impact on working memory results in improved performance of school-aged children and adults (Pearson, 2011). They offer an online set of learning tasks that help improve working memory. As you master a level you progress to another. If the participant is having trouble progressing then the online system alerts a trainer to contact the participant to work through the stuck-point. There have been a growing number of research articles published by Cogmed with 40 peer-reviewed and 80 published articles showing the positive effects of Cogmed training on many individuals. Currently, there are about 80 ongoing research projects with children, adolescents, as well as adults investigating the effects of Cogmed on a variety of clinical sub-populations (e.g., those with ADHD, cancer survivors, or intellectual disabilities).

When studying the effects of Cogmed training on children and adolescents, results showed that Cogmed training had a significant positive impact on visual-spatial working memory, inductive reasoning, executive functioning, and ADHD symptoms as rated by parents and clients themselves (Beck et al., 2010; Chacko et al., 2013; Dunning, Holmes, & Gathercole, 2013; Holmes & Gathercole, 2013; Klingberg et al., 2002; & Klingberg et al., 2005). Mezzacappa & Buckner (2010) conducted a pilot study in a school setting. They hypothesized that Cogmed would reduce ADHD symptoms, and result in improved performance on the Digit Span subtest of the Wechsler Intelligence Scale for Children (WISC-IV) and the Finger

Windows subtest of the Wide Range Assessment for Memory and Learning (WRAML2).

Findings supported these hypotheses using a small sample of nine participants.

Klingberg et al., (2002) and Klingberg et al., (2005) found scores on visuo-spatial working memory, inductive reasoning, and executive tasks increased following Cogmed intervention. It was also found that oppositional symptoms decreased as well as symptoms of inattention and hyperactivity (Klingberg et al., 2005). Outcome measures within these studies included a visuo-spatial task, span board task, digit span task, Stroop interference task, Raven's colored progressive matrices, and choice reaction time task. In 2010, Beck et al., utilized the findings of Klingberg et al., (2002) and Klingberg et al., (2005). Beck et al., (2010) found that inattentive behaviors decreased when measured by parents, and scores of executive functioning significantly increased at post-treatment and at a four-month follow-up. These domains were measured using the Conners' Rating Scale—Revised, Short Form and the Behavior Rating Inventory of Executive Function (BRIEF) (Beck et al., 2010).

As stated earlier, Cogmed has conducted numerous studies to evaluate whether the intervention has a significant effect on participants. The most typical procedure involves a pre- and post-testing period. The many studies involve various tests used during pre- and post-testing but overall most studies include a testing period prior to the intervention, a testing period immediately following, and in some cases a follow-up testing period between 3-6 months post intervention completion (Beck et al., 2010; Klingberg et al., 2002; & Mezzacappa & Buckner, 2010). This study followed a similar procedure with pre-, mid-, and post-testing before and immediately following the intervention. Half of the participants received pre- and post-testing (T1 and T3). The other half participated in a pre-testing period and mid-testing (T1 and T2).

Brighter Minds High Achievement Training (BrM) is a company in Oregon that provides cognitive training to people of all ages. They commonly work with the aging population focusing on age-related decline and the adult population with cognitive decline, life-time cognitive issues, or loss of cognitive ability following head injuries. Although, BrM works with all ages, one of their most common referrals are for school-aged children struggling with academic achievement. BrM has been working in the northwest for over 15 years, during which time they have accumulated much client testimony endorsing the effectiveness of their product (BrighterMinds, 2009; Holt, 2006). The purpose of this research is to provide an empirical investigation of the methodology used in the approach known as BrM High Achievement Training.

BrM claims that their training program improves the ability to recall information, to express thoughts more clearly, to process thoughts more quickly, and to communicate more effectively (Brighter Minds, 2009, homepage section). More specifically, in collaboration with the program's key trainers, K. Holt and E. Hoefer (personal communication, April 20, 2011), it was decided it would be most appropriate to measure the effects of the intervention on the following key areas: visual memory, attention and concentration, immediate recall, visual motor skills, sense of self, and academic performance in school.

Brighter Minds Training

BrM, a company in the Portland, Oregon metro area, provides cognitive training based on the GO-TEAK Mental Training Program using Winkelman Educational Readiness Technology (W.E.R.T.), as described by Dr. Douglas C. Winkelman (Holt, 2006). For more than 15 years, BrM has been using the theories created by Winkelman to increase cognitive functioning among school-aged children with learning struggles as well as the geriatric population experiencing

cognitive decline. Most clients attend a one-hour, weekly session for six to twelve months, and are requested to do procedures at home throughout the week between sessions. Winkelman began creating the mental training program to help children with learning disabilities in 1964. He was initially frustrated that most treatments involved treating the symptoms and not the “root cause”. This led him to create a program that would improve cognitive functioning. In 1982, Winkelman began designing the GO-TEAK (gustatory, olfactory, tactile, eyesight, auditory, and kinesthetic) mental training system. It is copyrighted and based upon 30 years of research by Winkelman (Brighter Minds, 2009; Holt, 2006).

To begin BrM training, a client must first participate in an evaluation called P.E.P (Penta-Graphic-Eidetic-Phonetic-Analysis) Test and a comprehensive interview. This information allows the trainer to assess the individual’s current information processing skills and help the trainer design an effective and efficient training process; all trainees participate in the same modules but may spend differing amounts of time gaining mastery (Holt, 2006). The process begins with gathering an intensive history of the area of concern and goals for the outcome, as well as a developmental, psychological, social, educational, and medical history with the client or guardian (Holt, 2006). This interview process usually takes 1-1.5 hours. Then the client proceeds with the P.E.P Test that was developed through the research conducted by Winkelman. He compiled a variety of measurements that help the trainer understand the current functioning (strengths and weaknesses) of the client in order to build a training plan (Holt, 2006). The evaluation includes tests of reading, academic achievement, visual-motor, spatial reasoning, and projective measures (Holt, P.E.P test evaluation, 2010).

Majority of clients participate in modules one through four, however they proceed at their own pace. Each client must master the task at hand prior to moving to the next task which accounts for the variation in individual treatment plans. There are seven modules available but it has been reported that the majority of the clients are satisfied with the improvement after modules one through four (personal communication, January 28, 2011; Holt, 2006). For this reason the following program evaluation will only include participants completing the first four modules. As the participant works through modules one through four in training there are 30 life approach skills that are instilled as a key component to the training; the life approach skills are discussed below.

BrM explains increasing the connections between brain cells facilitates the cognitive improvement. The BrM website states, “our mental performance training techniques build, anchor, strengthen, and stress-test new pathways in your brain” (BrighterMinds, 2009, Program Information section). This increase is due to the four major parts incorporated into the training of the GO-TEAK program used by BrM. The four parts consist of neurological development, mental programs, life approach skills, and language.

In the BrM manual, Holt (2006) writes that neurological development refers to stimulating one’s senses as a path to dendrite growth within the brain. As the environment stimulates the senses, it creates an electrical impulse that may or may not cause the neuron to ‘fire’. When the neuron does ‘fire’ it creates dendrite growth. BrM uses exercises to stimulate the senses through eyesight, hearing, speech, and tactile-kinesthetic systems simultaneously (Holt, 2006).

The mental programs are referred to as five critical brain programs, which are size, shape, position-in-space, figure-ground, and direction (Holt, 2006). These are the major mental programs at work in the brain at any given time. Holt (2006) also refers to a total of 43 sub-programs that are included under the major mental programs; for example, a sub-program classified under the major mental program of direction is dyslexia (Holt, 2006). BrM states that the trainee works on the different mental programs to better understand how to identify his or her own mental tools (i.e., an individual's unique way in which his or her brain functions). BrM training helps the trainee figure out the mental tools at work in their everyday functioning; this is similar to the psychological concept of self-awareness (Holt, 2006).

BrM training also incorporates a component of training known as life approach skills which are defined as “developmental processes needed for charting and directing one's life...they temper, refine and strengthen each trainee's life approach orientation” (Holt, 2006, p. 4). The life approach skills are said to help each trainee utilize his/her unique ‘brain functioning’ by teaching him or her to be aware of their mental functioning. Some examples of life approach skills include how to control anger and how to improve self-esteem (Holt, 2006).

Lastly, language is addressed as part of the BrM training. BrM considers language as the key avenue to information processing and therefore considers it an important aspect to its cognitive training. Language is a focus of the training to help the trainee think, use words, and understand words more effectively. The training includes the use of letters, words, phonics, spelling, handwriting and reading (Holt, 2006).

Once trainees have committed to training and finished the intake and P.E.P. evaluation, they attend weekly sessions at the BrM office. Clients are told that additional practice outside of

the weekly sessions leads to better and quicker improvements in information processing (personal communication, January 28, 2011; Holt, 2006). Within each of the modules the trainee learns and memorizes a visual stimulus, such as a chart of the alphabet in a certain pattern. Then, a motor component is added to the visual task such as requiring the individual to do a physical repeated movement at a pace that matches the visual recall of each letter in a certain pattern (e.g., engaging a walking process while visually recalling the letters or using a stick to bounce a ball at the same rate of recall). Then without the visual stimulus present the trainee visualizes the alphabet chart, with the movement, while additional visual or auditory stress is present (e.g., an introduction of auditory distractions such as speaking to the participant or waving visual stimulus in the peripheral visual field). Lastly, without the visual stimulus or stresses present the intervention continues. Once these four steps are mastered, then the trainee is ready to proceed to the next module.

Module 1 focuses on synchronizing auditory, visual, and motor systems. Module 2 builds upon Module 1 and focuses on finding balance among the left and right hemispheres of the brain allowing them to work evenly together. Module 3 focuses on multi-tasking and spatial adeptness by focusing on muscle motor in addition to Modules 1 and 2. Module 4 focuses on mental stamina and processing complex problems (Brighter Minds, 2009). See Appendix A for further lessons and examples of Modules 1-4.

The purpose of this study was to: 1) add to the CT literature related to school-aged children by evaluating Brighter Mind's impact, and 2) to empirically show whether there is a demonstrable improvement in cognitive functioning in several key areas identified by the program as important foci. Accordingly, the following hypotheses are advanced:

Null Hypotheses

1. There will be no change in short-term memory ability at the midpoint or at completion of modules 1-4 of BrM training.
2. There will be no change in the participant's self identity (as measured by the BASC-2 scales of Locus of Control, Sense of Inadequacy, Self-Esteem) at the midpoint or at completion of modules 1-4 of BrM training.
3. There will be no change in attention and concentration at the midpoint or at completion of modules 1-4 of BrM training.
4. There will be no change in the parent or guardian's and trainer's perception of the child at the midpoint or at completion of modules 1-4 of BrM training.
5. There will no change in the participant's grades or standardized test scores at the midpoint or at completion of modules 1-4 of BrM training.
6. There will be no change in visual motor skills at the midpoint or at completion of modules 1-4 of BrM training.

Chapter 2

Methods

Participants

The sample included 30 participants aged 7 to 17 years old ($M = 12.08$ years). Twenty-six participated in the post-test (T2 or T3) evaluation. Four participants did not complete the post-testing evaluation (T2 or T3) for various reasons including participant refusal, financial barriers, and transportation issues. Participants were 47% female ($n=14$) and 53% male ($n=16$). Ethnicity of participants included European-American (90%), Latino (3%), Asian (3%), and Native-American (3%). All participants spoke English as their primary language. The handedness of participants was 83% Right, 13% Left, and 3% Ambidextrous. Of the participants, 43% reported having an IEP or 504 Plan at school for a variety of school-based issues and 57% did not.

As part of the BrM standardized process, all participants were first evaluated by BrM to decide whether they were a ‘good candidate’ for BrM treatment. All participants that were noted to be ‘good candidates’ (as decided by BrM staff) were included in this study. A sample of 30 participants yielded an effect size of $\eta^2 = .31$, $p = .05$, with power of .90. While this is a large age/grade range, all enrolling in BrM were asked to participate without exception due to the limited number of participants that enter the program per month (generally, 6 per month). BrM personnel invited the parents/guardians to participate upon initial enrollment, and gave a consent form to those interested stating the purpose and requirements of the study. Once the parents agreed to participate, BrM personnel informed the researcher so that the parents could be

contacted to set up a meeting time to complete written informed consent and the Time 1 assessment. Participants were provided with a five-dollar cash incentive for participating at their second and final testing period. Participants who declined to complete the training and final assessments were not provided with the cash incentive. All ethical guidelines established by the American Psychological Association were followed.

Instruments

Several Meetings were held with BrM staff to discuss the domains that were most affected by BrM training. Once the domains were established, developmentally appropriate and psychometrically sound measures of that domain were selected, and demonstrated to the BrM staff who were asked to rate the suitability of a given measure for assessing a previously identified domain impacted by BrM. Ratings were completed using a 1 – 5 scale, (1 meaning the assessment did not measure the domain, 5 meaning it measured it very well). Only measures that were rated as a 4 or 5 were included in the study. This procedure was followed to ensure that what BrM personnel meant as a construct affected by their training, was adequately approximated in the measure selected to evaluate change induced in that construct by the cognitive programs.

The following domains were identified as likely to be positively impacted by the program: short-term memory, attention and concentration, self identity, parent and trainer perception, and academic performance. Consequently, at least one measure that assessed each domain in a psychometrically sound manner was selected. Each domain and the corresponding instrument(s) are noted in Table 1.

Table 1

Domains Assessed and Corresponding Domain Assessment Instrument

Domain	Assessment instrument	Procedures to be utilized
Visual memory	WRAML2	Design Memory and Picture Memory
Attention and Concentration	Conner's CPT	CPT, Finger Windows, and Number-Letter
Immediate Verbal recall	WRAML2	Sentence Memory
Visual motor skills	WRAVMA	Visual Motor, Visual Spatial, and Fine Motor Skills
Self Identity	BASC2	TRS, PRS, and sections of SRP pertaining to sense of self
Academic Performance	Grades and Standardized Test Scores	Prior year and current year reports
Subjective Input	Parent and Trainer Questionnaire	Questionnaires
Demographics		Age, gender, school year, race/ethnicity, primary language, and handedness

Note: WRAML2 = Wide Range Assessment of Memory and Learning, Second Edition;

WRAVMA = Wide Range Assessment of Visual Motor Ability; CPT= Continuous Performance Test; BASC2 = Behavioral Assessment System for Children, Second Edition; TRS = Teacher Rating Scales, PRS = Parent Rating Scales, and SRP = Self Report of Personality.

Wide Range Assessment of Memory and Learning-2nd Edition.

Wide Range Assessment of Memory and Learning-2nd Edition (WRAML2), (Sheslow & Adams, 2003) is a normed, standardized battery for measuring memory functioning and learning ability in persons 5- to 90-years of age. The assessment provides an overall General Memory Index as well as indices for Verbal Memory, Visual Memory, and Attention/Concentration. This study used the following subtests: a.) Design and Picture Memory, which comprise the Visual Memory Index, b.) Finger Windows and Number-Letter, which comprise the Attention and Concentration Index, and c.) Sentence Memory, which is a supplemental subtest that measures immediate verbal recall. Visual Memory refers to an individual's ability to store visual stimuli and subsequently recall the visual details and spatial inter-relationships. Attention and concentration measures assess an individual's ability to immediately recall rote auditory or visual sequences. Sentence Memory is a subtest that assesses immediate verbal memory.

The WRAML2 Manual (Sheslow & Adams, 2003) reports subtest item and person separation reliability coefficients ranging from .85 to 1.00 (person and item reliabilities of the subtests used in this study are found in Table 2).

Table 2

Person and Item Separation Reliability Data Regarding WRAML2 Subtests

Subtest	Person Separation Reliabilities	Item Separation Reliabilities
Design Memory	.94	.99
Picture Memory	.85	1.00
Finger Windows	.91	1.00
Number-Letter	.90	1.00
Sentence Memory	.92	1.00

Note: WRAML2 = Wide Range Assessment of Memory and Learning, Second Edition

Test-retest reliability data were also reported showing a range of correlations from .53 to .76 on the subtests being used in this study. The coefficients and mean score changes for each subtest being used in this study are found in Table 3 (Sheslow & Adams, 2003; Buros Institute of Mental Measurements & Silver Platter Information, Inc., 2011).

Table 3

Test-retest Data Regarding WRAML2 Subtests

Subtest	Average Scaled Score	Reliability Coefficient
	Difference (T2 - T1)	
Design Memory	1.6	.53
Picture Memory	.8	.65
Finger Windows	.2	.62
Number-Letter	.4	.60
Sentence Memory	.5	.76

Note. WRAML2 = Wide Range Assessment of Memory and Learning, Second Edition; T2 = second test administration, T1 = first test administration.

Wide Range Assessment of Visual Motor Abilities.

Wide Range Assessment of Visual Motor Abilities (WRAVMA) (Adams & Sheslow, 1995) is a measurement battery of Visual-Motor abilities for persons 3- to 17-years of age. (This test provides normative data for children aged 3-17, any participant who is above age 17 will be scored using the 17-year-old norms.) The WRAVMA provides measurements of Visual-Motor, Visual-Spatial, and Fine Motor skills using three subtests, which are Drawing, Matching, and Pegboard Test, respectively. The visual-motor subtest measures an individual's ability to coordinate the eye and hand to copy shapes. The visual-spatial subtest measures an individual's

ability to use spatial skills in order to select the correct alternative, typically based on shape, spatial orientation, size, etc. The fine motor skills subtest measures the individual's ability to quickly manipulate small pegs. This study used all three subtests for a comprehensive assessment of Visual Motor skills.

The WRAVMA is psychometrically sound and provides norms for each subtest using a standardized sample. Reliability measures of internal consistency indicated $r = .93$ for the Drawing test and $r = .95$ for the Matching tests. Split-half and coefficient alphas are also reported for each age group, and range from .63 to .90. Test-retest data varies from $r = .82 - .89$ among the three tests over a six-week period. Concurrent validity data are provided with correlations between the WRAVMA Drawing subtest and the drawing components of the Developmental Test of Visual Motor Integration ($r = .76$) and the Matching subtest with the Motor-Free Visual Perception Test ($r = .54$) (Adams & Sheslow, 1995; Buros Institute of Mental Measurements & Silver Platter Information, Inc., 2011).

Conners' Continuous Performance Test-II.

Conners' Continuous Performance Test-II (CPTII, Conners, 2010) is a computerized assessment tool used to assess sustained attention in persons older than five years of age. The participant was asked to press a computer spacebar when any letter appears that is different than the target letter. The participant's performance was rated using the following scores: commission errors, omission errors, reaction time, and reaction time consistency. CPTII test-retest data are reported on these variables, using a three-month period between testing periods, and range from .55 - .84 (Conners, 2010; Buros Institute of Mental Measurements & Silver Platter Information, Inc., 2011).

Behavior Assessment System for Children, Second Edition.

Behavior Assessment System for Children, Second Edition (BASC-2, Reynolds & Kamphaus, 2004) is a comprehensive measure of behaviors and emotions of children and adolescents ages 2- to 21-years-old. This study used the Teacher Rating Scale (TRS) forms for ages 6-11 and 12-21, Parent Rating Scale (PRS) forms for ages 2-5, 6-11, and 12-21, and several scales of the Self-Report of Personality (SRP) forms for ages 8-11 and 12-21. The scales used from the SRP were Locus of Control, Sense of Inadequacy, and Self-Esteem as these are most applicable to the expected changes as noted by BrM staff. The PRS and TRS were used in their entirety. SRP, TRS and PRS scores were used to obtain separate and cross-informant measures of the child's behaviors and emotions at home and school.

The BASC-2 is sound psychometrically with normative data based on a stratified U.S. sample from ages 4 to 18 years. The BASC-2 manual includes detailed internal consistency and test-retest reliability estimates for the TRS, PRS, and SRP and inter-rater reliability on the TRS and PRS reported from the mid .80's to mid .90's. Validity measures on the BASC-2 range from .60 to .80 when correlating internally and with other similar measures such as the Achenbach Behavior Scales. Test-retest data were obtained over 0-88 days and ranged between .80 - .91. The intercorrelations among the 3 subscales of the SRP range from -.41 to .66 (see Table 4).

Table 4

Intercorrelations of Scales used from the BASC2 SRP

	Locus of Control	Sense of Inadequacy	Self-Esteem
Locus of Control	-	.65	-.41
Sense of Inadequacy	.66	-	-.45
Self-Esteem	-.45	-.49	-

Note: BASC2 = Behavior Assessment System for Children, 2nd Edition, SRP=Self Report of Personality.

The PRS and the TRS use a four-point frequency scale to rate the child's behaviors and emotions ("never, sometimes, often and almost always") (Buros Institute of Mental Measurements & Silver Platter Information, Inc., 2011 & Reynolds & Kamphaus, 2004).

Parent and Trainer Questionnaire.

In addition, each parent/guardian of the participant was asked to respond to four subjective questions related to the participant's progress using a 5-point likert scale format. These questions, which appear in Appendix B, were collected during the participant's two testing periods (either T1/T2 or T1/T3). An index of the parent's/guardian's and trainer's subjective impressions is being included to provide a qualitative measure of the participants memory, behavior, attention and concentration, grades and standardized test scores.

Handwriting Copy Task.

Handwriting Copy Task is a measure of speed of writing and handwriting quality. The participant was asked to copy a sentence that contains all letters of the alphabet. This instrument is an ecologically anchored tool used to measure handwriting skills. Scoring criteria from the Wechsler Individual Achievement Test-III (WIAT- III) was adapted to score this measure. Three raters scored the participants' handwriting performance to establish an acceptable inter-rater reliability of .85 or higher (see Appendix S for scoring criteria).

Grades and Standardized Test Scores.

Finally, for each participant, school grade reports and standardized test scores were requested from the year prior and following the start of his/her BrM's training. This was intended to provide a "real world" estimate of improvement in academic areas within the school setting, which presumably is the expectation most parents have when enrolling their children in the BrM program. Using these several and wide ranging measures, it was hoped that any consistent

improvement would be detected in areas identified by BrM as those impacted by the program. However, the grades and standardized test scores were not collected in entirety making interpretation limited.

Procedure

Approval from the George Fox University Human Subjects Review Committee was obtained before implementing this research project. Data collection began after receiving IRB approval in March of 2012 and ended in February of 2013. Each participant was offered a five-dollar cash incentive at the end of the study for participating in the pre- and post-intervention testing sessions.

Pre-, Mid-, and Post-testing Period.

As participants were progressively enrolled in BrM training, they were invited to participate in the research study. Upon expressing interest to BrM staff, the parents were provided the written informed consent form and were contacted by the researcher within a week to set up a meeting time. The initial meeting time was arranged for the pre-testing period and the parent/guardian completed the informed consent at the meeting with the researcher. Then the participant and researcher completed the assent form and began the first testing period. For all clients, pre-testing began before starting the BrM intervention program.

Testing occurred in appropriate rooms at the two George Fox University locations in Tigard and Newberg. Occasionally an appropriate private study room was used at Tigard Public Library when rooms at George Fox University were not available. Locations were chosen for convenience based on the participants' residence. Each parent/guardian was given a BASC-2 Parent Form to complete while their child was in the testing session. They were also given a Teacher Form to give to the participant's homeroom teacher. The Teacher Form was

accompanied with a pre-stamped envelope addressed to the investigator to ensure ease of return and confidentiality and a cover letter (see Appendix F) indicating why the teacher was being asked to complete the form. The BASC-2 has instructions on the form for both the parent and teacher to follow. The parent/guardian was also provided with a subjective questionnaire to fill out while their child was in the testing period (parent rating scale (see Appendix B)).

The assent procedure was completed with the participant (see Appendix E) in the testing room prior to beginning the testing period. This form included information about voluntary participation that could be withdrawn at any time, release of school transcripts, the method to insure confidentiality, and their right to request the results of the current study upon completion. All participants' information was kept confidential. Each participant was assigned a client number in the data recording process to ensure confidentiality of identity. All forms were kept in individual folders with the appropriate assigned client number. The folders were then kept in a locked box. The participant was asked whether he or she had any questions before beginning the testing period.

The 30 participants were randomly divided into two groups. The first group of 15 children or adolescents participated in pre- and post-testing (T1 and T3). The second group participated in pre- and mid-testing (T1 and T2). This provided measurement to account for possible change that may have occurred through rapport building and being given extra attention, which, if these factors played a role, they should have been able to be detected by the mid-point of BrM training (in essence, a control group). It also allowed examination of a dose effect, that is, whether a participant continued to benefit incrementally across all four modules, or whether the gains were more apparent in the first or second half of the interventions.

Each of the test measures was administered using the respective standardized procedure. Each participant was told he/she could take breaks throughout. Each participant was administered the testing measures in a randomized order to control for testing fatigue. Randomization of subtests was completed by assigning a number to each of the 11 test procedures, then the first participant received tests in the order of 1-11. The next participant received tests in the order 2-11 and then subtest 1, and so on. Participants received whatever order is next in this sequence for their first testing session. A similar procedure was used for the second testing session (mid- or post-testing). Each participant completed all of the following procedures: the selected subtests of the WRAML2 (see Appendices G-K for subtest directions), the WRAVMA (see Appendices L-N for directions), the Connors' CPTII (see Appendix R for directions), portions of the BASC-2 SRP (see Appendix Q), and a short handwriting copy-task (see Appendix S). The entire testing duration ranged between 90 -115 minutes. After the participant finished the randomized testing period he or she was asked not to discuss the content of the assessments in order to avoid influencing responses of other participants or the BrM trainers.

Brighter Minds Intervention.

After the T1 testing period was completed, the participant began the BrM program within approximately two weeks following testing. A certified BrM trainer conducted the BrM training in a small group manner, completing modules 1-4 over approximately 40 weeks at the longest. At the completion of module 2, 15 of the participants completed the T2 testing period. The remaining participants were scheduled for T3 testing period after completing modules 1-4 of BrM training. Upon completion of the second testing period all parents were asked to provide their child's grade reports and standardized test scores associated with their testing periods. They

were asked to provide the last grade report prior to beginning BrM training and the next available grade report after their second testing period with the researcher. They were also asked to provide all standardized test scores available while participating in BrM training. However, these scores were not fully collected; only 50% of the grades (13/26 participants) and 12% (3/26 participants) of the standardized test scores were submitted. Multiple attempts were made to remind parents without success. These efforts included one face-to-face request individually with each parent, six email requests, and then three additional emails with an attached and completed release of information requiring a parental signature, which would allow the school to send the information directly to the researcher.

All testing periods were held in appropriate testing rooms at George Fox University Tigard and Newberg campus and occasionally at Tigard Public Library in a private study room. Every effort was made to schedule the post-testing assessment within one week of the client's concluding BrM training. All testing periods, including content and sequence, were conducted using a randomized ordering procedure as the first testing session. Each participant and parent/guardian was notified of the locations of the research results and offered a summary of the results should they be interested after completion.

Table 1

Domains Assessed and Corresponding Assessment Instruments being Used

Domain	Assessment instrument	Procedures to be utilized
Visual Memory	WRAML2	Design Memory and Picture Memory
Attention and	Conner's CPT	CPT

Concentration	WRAML2	Finger Windows, Number-Letter
Immediate Recall	WRAML2	Sentence Memory
Visual Motor skills	WRAVMA	Visual Motor, Visual Spatial, Fine Motor Skills
Self Identity	BASC-2	TRS, PRS, and sections of SRP pertaining to sense of self
Academic Performance	Grades and Standardized Test Scores	Prior year and current year reports
Subjective Input	Parent and Trainer Questionnaire	Questionnaires
Demographics		Age gender, school year, race/ethnicity, primary language, handedness

Note: WRAML2 = Wide Range Assessment of Memory and Learning, Second Edition; WRAVMA = Wide Range Assessment of Visual Motor Ability; CPT= Continuous Performance Test; BASC2 = Behavioral Assessment System for Children, Second Edition; TRS = Teacher Rating Scales, PRS = Parent Rating Scales, and SRP = Self Report of Personality.

Chapter 3

Results

Demographics

For the results reported below, a significance level of .05 or less was selected for all statistical tests conducted. All assumptions were met for each of the analyses reported below. The term post-test is used below to indicate results using a combined group of T2 and T3 participants whenever a T2 vs. T3 comparison was found non-significant. This was done in order to increase the sample size as well as to simplify the reporting of results when no dose effect (T2 vs. T3) was found significant.

A *t*-test was computed to examine whether at T1 there were age differences between the T2 ($n = 12$) and T3 ($n = 14$) subgroups, whose ages were 12.0 years ($SD = 3.07$) and 12.1 (3.52) years, respectively; no significant difference was obtained. Gender equivalency was also evaluated between the T2 and T3 subgroups at T1 using a Chi Square test; there was no significant difference. Also examined was IEP and 504 plan status (i.e., whether the child was or was not on an IEP or 504 plan and therefore officially identified by the school district as a student who requires accommodations or special education interventions). Using the Chi Square test, no significant difference was found at T1 in the proportion of students with IEPs or 504s between T2 and T3 subgroups. Therefore, the two subgroups (T2 and T3) were equivalent in age, gender proportion, and special education allocation at the outset of the study.

Null Hypothesis 1

The first hypothesis postulated there would be no change in short-term memory ability as a result of the BrM training (as measured by three WRAML2 subtests: Design Memory, Picture Memory, and Sentence Memory, which fall in the two domains of Immediate Visual Memory and Immediate Verbal Memory). Table 5 displays the T1, T2, and T3 scores for these subtests.

Table 5

Means (SDs) at T1, T2, and T3 for Short-term Memory Measures

Immediate Visual or Verbal Immediate Recall Subtest	T1 (<i>N</i> = 25)	T2 (<i>n</i> = 11)	T3 (<i>n</i> = 14)	T2/T3 (<i>N</i> = 25)	<i>P</i>
WRAML2 Design Memory	8.30 (3.69)	8.73 (3.66)	8.53 (3.04)	8.62 (3.25)	<i>ns</i>
WRAML2 Picture Memory	9.60 (3.08)	10.64 (2.54)	9.73 (3.04)	10.12 (2.82)	<i>ns</i>
WRAML2 Sentence Memory	10.57 (3.28)	10.64 (2.77)	11.13 (2.23)	10.92 (2.43)	<i>ns</i>

Note. T1 = Time 1 (pre-intervention); T2 = Time 2 (mid-intervention); T3 = Time 3 (end-intervention); WRAML2 = Wide Range Assessment of Memory and Learning, Second Edition.

Based on a 3 (subtest) x 2 (T2 vs. T3) repeated measures MANOVA, the participants tested at T2 and T3 did not differ significantly in the way they performed on the three tests (i.e., there was no interaction between post-test subgroups (T2 and T3) and subtests). Therefore, T2 and T3 data were pooled and treated as post-test scores. To examine whether a change in short-

term memory scores followed BrM training, a repeated measures 3 (subtest) x 2 (post-test performance) MANOVA was computed. No significant difference between subtests was obtained. No significant difference between pre- and post-test scores resulted. The interaction effect was also non-significant. Even though the three post-treatment scores were somewhat higher than pre-treatment scores, these increases were not beyond chance levels; therefore, there was no evidence that BrM intervention significantly impacted short-term memory performance.

Null Hypothesis 2

The second hypothesis postulated there would be no change in the participant's self identity (as measured by the BASC-2 scales of Locus of Control, Sense of Inadequacy, Self-Esteem and Self-Reliability, which fall in the domain Self Identity) at the midpoint or at completion of modules 1-4 of BrM training. Table 6 displays the T1, T2, and T3 means and SDs for these BASC-2 subtests.

Table 6

Means (SDs) at T1, T2, and T3 for BASC-2 SRP Self Identity Subtests

Self Identity	T1 (N = 25)	T2 (n = 13)	T3 (n = 12)	T2/T3 (N = 25)	<i>p</i>
Locus of Control	54.40 (8.85)	54.85 (10.12)	51.75 (9.10)	53.36 (9.57)	<i>ns</i>
Sense of Inadequacy	57.15 (9.78)	52.54 (8.43)	53.25 (11.81)	52.88 (9.98)	<i>ns</i>
Self-Esteem	50.85 (10.55)	54.92 (6.83)	50.83 (11.84)	52.24 (9.55)	<i>ns</i>

Self-Reliability	50.89	52.31	47.25	52.12	<i>ns</i>
	(6.82)	(8.75)	(8.83)	(9.11)	

Note. T1 = Time 1 (pre-intervention); T2 = Time 2 (mid-intervention); T3 = Time 3 (end-intervention); BASC-2 SRP = Behavior Assessment System for Children – Second Edition, Self Report of Personality.

Based on a 4 (subtest) x 2 (T2 vs. T3) repeated measures ANOVA, the participants tested at T2 and T3 did not differ significantly in the way they responded to each of the four tests (i.e., there was no interaction between post-test subgroups (T2 and T3) and subtests). Therefore, T2 and T3 data were pooled and treated as post-test scores. To examine whether a change in self identity resulted, a 4 (subtest) x 2 (pre- vs. post-test performance) repeated measures MANOVA was computed using T-scores. Performance across the four subtests was found to be equivalent. No significant difference between pre- and post-test scores resulted. Neither was a significant subtest x pre vs. post interaction effect found. Therefore, there was no evidence that BrM intervention impacted the overall measure of self identity, nor any of its four constituent components. It should be noted that all T1, T2 and T3 self identity subtest scores were consistently within non-clinical ranges.

Null Hypothesis 3

The third hypothesis postulated there would be no change in attention and concentration performance (as measured by four scores from the Conners' CPT, and two subtests scores from the WRAML2) following BrM training. Table 7 displays the T1, T2, and T3 scores for each of the attention and concentration measures. The CPT measures are expressed as T-scores and the WRAML2 measures are expressed as scaled scores.

Table 7

Means (SDs) at T1, T2, and T3 for Attention and Concentration Scores

Attention and Concentration Measures	T1 (N= 26)	T2 (n = 13)	T3 (n = 13)	T2/T3 (N = 26)	<i>p</i>
CPT - Omissions	52.83 (13.21)	46.46 (6.20)	57.08 (12.30)	51.77 (10.97)	<i>ns</i>
CPT - Commissions	52.70 (8.74)	54.62 (10.61)	54.54 (9.11)	54.58 (9.69)	<i>ns</i>
CPT – Hit Response Time	45.37 (10.29)	47.54 (13.03)	48.92 (7.67)	48.23 (10.50)	<i>ns</i>
CPT – Rate of Consistency	48.77 (6.36)	50.46 (9.58)	53.46 (21.68)	51.96 (16.49)	<i>ns</i>
WRAML2 – Finger Windows	7.20 (2.73)	8.73 (3.00)	7.93 (3.63)	8.27 (3.34)	<i>ns</i>
WRAML2 – Number Letter	9.03 (3.44)	9.91 (3.70)	10.33 (2.69)	10.15 (3.09)	<i>ns</i>

Note. T1 = Time 1 (pre-intervention); T2 = Time 2 (mid-intervention); T3 = Time 3 (end-intervention).

CPT = Conners' Continuous Performance Test, Version 5, WRAML2 = Wide Range Assessment of Memory and Learning, Second Edition. CPT data are reported as T-scores, WRAML2 data are reported as scaled scores. Scores were converted to *z*-scores for analyses.

Because of the different metrics used, CPT and WRAML2 scores were converted to z -scores, which were then used for the analyses that follow. Based on a 6 (subtest) x 2 (T2 vs. T3) repeated measures MANOVA, the participants tested at T2 and T3 did not differ significantly in the way they performed on the six tests (i.e., there was no T2 vs. T3 difference, nor a significant interaction between post-test subgroups (T2 and T3) and subtests). A 6 (subtest) x 2 (post-test performance) repeated measures MANOVA was then computed revealing no effect of the intervention; the pre vs. post attention scores did not differ significantly. There was no main effect of subtest. There was no interaction between time of testing and subtest. Therefore, there was no evidence that BrM intervention impacted attention and concentration.

Null Hypothesis 4

The fourth hypothesis postulated there would be no change in the parent's/guardian's and trainer's perception of the child (as measured by the parent and trainer questionnaires, which fall in the Subjective Input Domain) at T2 or at T3 of BrM training. Parent/Guardian and Trainer scores were analyzed separately because parents completed the questionnaire at pre (T1) and post (T2 or T3) times, but trainers completed the form at post only (T2 or T3). Table 8 displays the T1, T2, and T3 scores for the parent questionnaire. Table 9 displays the T2 and T3 scores for the trainer questionnaire.

Table 8

Means (SDs) at T1, T2, and T3 for Parent/Guardian Questionnaire Ratings

Subjective Rating	T1 (<i>N</i> = 24)	T2 (<i>n</i> = 12)	T3 (<i>n</i> = 12)	T2/T3 (<i>N</i> = 24)	T1 vs. T2/T3 <i>p</i> -value
Question 1, Memory	5.18 (2.41)	6.68 (2.66)	6.54 (2.69)	6.60 (2.62)	<i>p</i> = .004*
Question 2, Behavior	6.18 (2.46)	7.11 (2.13)	7.16 (1.73)	7.14 (1.87)	<i>p</i> = .012*
Question 3, Attention	4.10 (2.46)	5.91 (2.83)	5.02 (2.54)	5.41 (2.65)	<i>ns</i>
Question 4, Grades	4.10 (2.56)	5.16 (2.86)	5.09 (2.92)	5.12 (2.83)	<i>ns</i>

Note. T1 = Time 1 (pre-intervention); T2 = Time 2 (mid-intervention); T3 = Time 3 (end-intervention; Question 1 = Memory, Question 2 = Behavior, Question 3 = Attention and Concentration, Question 4 = Grades; see Appendix B for actual questionnaire. *Bonferroni Correction: *p* = .013.

Table 9

Means (SDs) at T2 and T3 for Trainer Questionnaire Ratings

Subjective Rating	T2	T3	T2/T3	<i>p</i>
	(<i>n</i> = 12)	(<i>n</i> = 14)	N = 26	
Question 1, Memory	7.52 (2.50)	7.02 (2.64)	7.29 (2.52)	<i>ns</i>
Question 2, Behavior	7.95 (1.91)	6.75 (2.33)	7.39 (2.16)	<i>ns</i>
Question 3, Attention/Concentration	8.25 (1.03)	7.98 (1.05)	8.13 (1.03)	<i>ns</i>

Note. T2 = Time 2 (mid-intervention); T3 = Time 3 (end-intervention).

Using a 4 (questions) x 2 (T2 vs. T3) repeated measures MANOVA, it was again shown that T2 scores did not differ from T3 scores overall, nor for individual questions. Consequently, to examine whether a change in parent/guardian perception resulted, a 4 (questions) x 2 (pre- vs. post-treatment) repeated measures MANOVA was computed. Overall, a significant effect was found for questions ($F(3, 72) = 7.16, p < .000, \eta^2 = .23$) and for treatment ($F(1, 24) = 11.76, p = .002, \eta^2 = .33$), with post-treatment ratings being found higher; the interaction effect was non-significant. Pairwise comparisons across questions, showed ratings for Questions 1 and 2 did not differ, but both questions were rated higher than questions 3 and 4, which did not differ from each other. Figure 1 illustrates these findings. Therefore, parents subjectively rated their children

as performing better on Memory and Behavior after exposure to BrM treatment, but not in Attention or School Grades, and again, the parent ratings did not differ between those with shorter *vs.* longer involvement in the program.

Trainers filled out a subjective questionnaire at the post-testing periods (T2 and T3), rating the participant for memory, behavior, and attention abilities when compared to peers. To test whether trainer perception was different, a 3 (question score) x 2 (T2 *vs.* T3) repeated measures MANOVA was conducted. There was no difference in trainer perception of the participants' abilities between T2 and T3, across the three questions, or for any one question. Then, a one-way ANOVA on post-test rating across the three questions was computed to assess the trainers' subjective improvement ratings of the students. Trainers rated the students significantly higher on Question 3 (Attention/Concentration) ($F(2, 23) = 3.85, p = .04$). Therefore, while the trainers' ratings were positive about the performance of their students in memory, behavior, and attention, there was no evidence that these ratings differed for those with shorter *vs.* longer involvement in the program.

Null Hypothesis 5

The fifth hypothesis focused on the Academic Performance domain; it was postulated that there would no change in the participant's grades or standardized test scores from T1 to T2 or T3. Unfortunately, these data were only partially obtained despite many attempts, including one face-to-face request with each parent, six subsequent e-mail requests or reminders, and then three additional e-mails providing a completed release of information requiring only a parental signature, which would allow the school to send the information directly to the researcher.

The researcher obtained 13 grade reports of the 26 participants (50% of the participants who completed the study) and only three standardized test scores of the 26 students (12% of the

participants who completed the study). The obtained grades were converted to grade point averages (GPA) with a range from 0 to 4.0, and are reported in Table 10.

Table 10

Means (SDs) at T1, T2, and T3 for GPA

	T1	T2	T3	T2/T3
Academic Performance	(N = 13)	(n = 5)	(n = 8)	(N = 13)
Participant's GPA	2.67	2.37	2.97	2.74
	(0.93)	(0.47)	(0.72)	(0.68)

Note. T1 = Time 1 (pre-intervention); T2 = Time 2 (mid-intervention); T3 = Time 3 (end-intervention). GPA = Grade Point Average on 4-point scale.

The standardized test scores, are not reported because only three scores were obtained, and each used a different metric making interpretation impossible. Of the 13 students for whom grades were obtained, 46% showed an increase in GPA, 46% showed a decrease, and 8% showed no change from pre- (T1) to post-treatment (T2/T3). Given these proportions, it was not surprising that a one-way ANOVA

Figure 1. Parent ratings of their child's performance, pre (T1) and post (T2/T3) BrM treatment.

using GPA scores (T1 vs. T2 vs. T3) was not found significant. Based on the findings related to grades, there is little evidence that BrM intervention impacts academic improvement within the same year it was obtained.

Null Hypothesis 6

The final hypothesis postulated there would be no change in visual motor ability as a result of the BrM training (as measured by three WRAVMA subtests: Drawing, Matching, and Pegboard, which comprise the test's three interrelated domains of Visual Motor, Visual Spatial, and Fine Motor). Table 11 displays the T1, T2, and T3 scores for these subtests.

Table 11

Means (SDs) at T1, T2, and T3 for Visual Motor Subtests

	T1	T2	T3	T2/T3	<i>p</i>
Visual Motor	(<i>n</i> = 25)	(<i>n</i> = 11)	(<i>n</i> = 14)	(<i>N</i> = 25)	
WRAVMA - Drawing	110.04 (13.70)	107.64 (12.55)	109.57 (13.79)	108.72 (13.02)	<i>ns</i>
WRAVMA - Matching	100.40 (14.21)	96.45 (14.11)	103.50 (14.01)	103.56 (14.23)	<i>ns</i>
WRAVMA - Pegboard	100.20 (20.94)	99.45 (13.84)	104.36 (16.01)	102.20 (14.99)	<i>ns</i>

Note. WRAVMA = Wide Range Assessment of Visual Motor Abilities

Based on the results of a 3 (subtest) x 2 (Pre *vs.* Post) x 2 (T2 *vs.* T3) repeated measures MANOVA, the participants tested at T2 and T3 did not differ significantly in the way they performed on the three tests (i.e., there was no T2 *vs.* T3 dose effect nor was the interaction between post-test subgroups (T2 and T3) and subtests significant). A significant difference between subtests was obtained, with the Drawing subtest being performed better than the Spatial and Fine Motor subtests ($F(2, 22) = 6.49$, eta squared = .37), which themselves did not differ. No interactions among main effects were found significant, including the subtest x pre *vs.* post interaction. Therefore, there was no evidence that BrM intervention significantly impacted visual motor performance.

Chapter 4

Discussion

Summary of Findings

This research investigated the effectiveness of BrM High Achievement Training in five major domains identified by BrM staff as key areas on which the program focused. Results of this study showed that the BrM intervention had no measurable effect on any of these objective cognitive domains. In contrast, subjective parent/guardian ratings reflected significant perceived improvement in the areas of client memory and behavior.

It is possible the improvement indicated in the parents' subjective ratings is due to a placebo effect; parents may be looking for improvement within these scales. Festinger's (1957) theory of cognitive dissonance suggests people seek to reduce incongruence's between personal beliefs and external information. That is, having invested time (one hour weekly trainings for up to 40 weeks) and finances in the intervention therapy, positive change is likely to be perceived regardless of the outcome. It is also possible that the training, which parents have the option to observe, improved the relationship between parent and child, thus positively impacting parent perception from improved parent-child interactions. Perhaps the parents were most hopeful for change in memory and behavior as opposed to the domains subjectively unaffected, attention and grades. Perhaps the two most noticeable aspects of the children's functioning when at home, under parental supervision, are memory and behavior.

While it is possible the five domains investigated did not include those most impacted by the BrM interventions, it should be remembered that BrM staff identified the domains

investigated as those most affected by their program, and agreed, when demonstrated, that the measures used seemed appropriate to assess the cognitive skills being remediated within each domain. Therefore, it is not likely the negative results are due to the fact that the measures were not targeting domains focused on by the intervention.

Prior to the present study, BrM had no empirical measurements of its effectiveness, but had received years of supportive parent and participant testimony. Another CT program known as Cogmed, mentioned in the introduction, has reported numerous studies with significantly improved cognitive functions. Much of the literature published on Cogmed indicates that this cognitive remediation program has a significant positive effect on child and adolescent visual-spatial working memory, inductive reasoning, executive tasks, and a reduction in ADHD symptoms as rated by parents and self (Beck et al., 2010; Klingberg et al., 2002; & Klingberg et al., 2005). Another Cogmed research study by Mezzacappa and Buckner (2010) found reduced ADHD symptoms and improved performance on the WISC-IV Digit Span and WRAML2 Finger Windows subtests. Therefore, it was hypothesized that BrM may also have significant effects on cognitive domains. However, the evidence suggests that BrM intervention is not significantly impactful. Therefore, while there is some overlap, the focus of Cogmed does seem to be different than that of BrM.

BrM may demonstrate ineffectiveness because it focuses on different cognitive domains. Cogmed focuses primarily on working memory with individuals identified as meeting criteria for ADHD and BrM did not use participants that would be identified as ADHD based on the criteria used for the measures used in other research studies and the current one evaluated in this study. In addition, BrM named multiple differing domains of impact none of which was working memory. Also, BrM has a different way of administering the training and different tasks

involved in the training. The learning tasks are not the same between the two interventions and BrM has an in-person administration whereas Cogmed training is administered online.

Therefore, it is difficult to assess the differences between intended impact of both programs and further research could help clarify.

Another difference between BrM and Cogmed is they were developed separately using different theories. Cogmed was developed based on research reporting that individuals with ADHD have a specific deficit in visuo-spatial working memory. Then Cogmed developed specific tasks that were proven to impact that domain (Pearson, 2013). BrM writes they seek to “rebuild the learning foundation” (Get Cognified, 2013, High Achievement Training section), working on the plasticity of the brain and dendrite growth (Get Cognified, 2013) but do not identify visual memory as an area of special remedial attention.

It could also be argued that participants had insufficient exposure to the intervention being provided. However, the T3 subgroup experienced what BrM had described as a typical length of intervention. Plus, no dose related effect was apparent when comparing T2 to T3, a puzzling finding if length of intervention is an important factor.

Given the importance of early intervention (Love, Chazan-Cohen, Raikes, & Brooks-Gunn, 2013), it was conjectured that maybe the BrM intervention might have measurable impact on the younger participants, and by adding the older participants, the effect was diluted. Therefore, analyses to examine whether age had an impact on outcome was conducted. Four two-way (young vs. old x T1 vs. T2/T3) repeated measures MANOVAs on each of the four domains (self identity, short-term memory, attention and concentration, and parent questionnaire) revealed no significant age effect. Therefore, earlier BrM intervention does not seem to produce a differential impact.

In reviewing the current study's results, it was noticed that the WRAML2 Finger Windows subtest, which is a measure of attention and concentration and visual working memory, showed a reasonable increase from T1. However, when this subtest was analyzed with the four Conners' CPT subtests, there was no significance found using the overall attention domain. However, when analyzed alone, the performance on Finger Windows yielded a significant intervention effect ($t(25) = -2.69, p = .013$). Therefore, it seems possible that a different process of attention and concentration was positively impacted by BrM training than is measured by the Conners' CPT variables. This finding is consistent with reports that Cogmed remediation training results in improving performance on the Finger Windows subtest (Mezzacappa and Buckner, 2010). The WRAML2 Finger Windows subtest of Attention/Concentration differed from the Conners' CPT variables in that it is a task involving sequencing and rote short-term memory rather than reaction time and simple sustained attention. Further research could help replicate and better define what aspects of attention and concentration are positively impacted by BrM training.

The findings of this research may help direct future exploration of functions positively impacted by BrM intervention. The areas parents perceived as improving were memory and behavior. Future research may benefit from a broader focus on memory and behavior. Particularly it would be helpful to have a more sensitive measure for the parent to complete and may help operationalize the everyday aspects of memory and behavior they see as positively impacted. For instance, the following assessments could be used to better assess memory and behavior changes: Conners 3 Parent Assessment Scale, BRIEF (Behavior Rating Inventory of Executive Function), and ASEBA (Achenbach System of Empirically Based Assessment). These scales can help gather further information about what parents see as changes in their child's

behavior and memory. The Conners 3 and BRIEF (both of which are parent report scales) were found to show significant improvement following other CT programs (Beck et al., 2010 & Klingberg, et al., 2005). Perhaps BrM would also find greater impact if they focused more on measures of working memory, given the results noted with the Finger Windows subtest. It is possible the battery of assessments provided breadth over depth. For instance, there were nine objective subtests used to measure memory and attention and although eight were not impacted one was positively impacted; additionally one subjective memory measure significantly improved. Therefore it might be useful to select multiple measures of a certain type of memory (e.g., working memory) to analyze this cognitive domain in greater in-depth.

Limitations

There are possible methodological concerns related to the validity of the findings of this program evaluation. One might consider the sample size as insufficient. However, Mezzacappa & Buckner (2010), used an even smaller sample size ($N = 9$) and found significant CT results with large effect sizes ($d' = 0.73, 0.92$, and 1.02 across various measures of ADHD symptoms and memory). Another study by Klingberg et al. (2002) found significance across domains with a similarly small sample; no effect sizes were reported ($N = 14$ and $p = 0.05$ to $.00008$). Plus, one might argue that if large sample sizes are needed to demonstrate an effect, then such a subtle effect, while statistically significant, is not what those enrolled are expecting, and therefore may not be very meaningful, ecologically.

Another methodological limitation of this study is the lack of control group. Based on current research (Klingberg et al., 2005; Klingberg et al., 2003; & Mezzacappa & Buckner, 2010), it seems it would be beneficial to compare children and adolescents with and without an ADHD diagnosis. Considerable research has been reported that the Cogmed intervention

program demonstrates an impact on working memory with children and adolescents diagnosed with ADHD (Beck et al., 2010; Chacko et al., 2013; Klingberg et al., 2002; & Klingberg et al., 2005). Therefore, BrM may find greater program impact if they used individuals previously diagnosed with ADHD or other impairments known to impact learning. Although, many of the participants in the current study showed learning struggles in school, as a group, the participants did not perform at levels commensurate with those having ADHD or abnormal levels of behavioral difficulties.

Similarly, another possible limitation of this study is the relative lack of impairment characterizing most participants (although BrM felt the sample was representative of the clients they tend to serve). If the participants were not highly impaired at the outset, there may have been limited range for significant change to be observed between pre- and post-testing. It is possible that those more clinically impaired would show greater change with the BrM intervention. For example, Cogmed asserts they are most effective with children and adolescents with attention deficits (Chacko et al., 2013; Klingberg et al., 2005; Klingberg et al., 2003; & Mezzacappa & Buckner, 2010). To examine this possibility, subtests of this current study were examined for degree of impairment and improvement realized. Of the 22 subtests utilized in this study, only three subtests had a large number of participants who scored above the clinical cut-off at the start of the intervention. Therefore, paired sample *t*-tests were used to assess the amount of change for those more impaired participants from (T1) to (T2/T3). In the short-term memory domain, 27% (7 of 26) of the participants scored within a clinical range at the pre-testing period in the Design Memory subtest. There was no significant change in scores from T1 to T2/T3 for these more impaired participants. In this study's Attention and Concentration domain, 50% (13 of 26) of the participants had scores within a clinical range for the Finger

Windows subtest and 23% (6 of 26) of the participants had scores within the clinical range for the Number-Letter subtest at T1. For the clinical subsample, there was a significant improvement in scores ($T1 = 7.2 (2.73)$ to $T2/T3 = 8.27(3.34)$) on the Finger Windows subtest ($t(25) = -2.69, p = .013$) from T1 to T2/T3, but no significant change on the Number-Letter subtest. Of the three subtests that had a large number of individuals scoring within the impaired range, only one subtest showed significant impact. Therefore, it does not seem likely that a more impaired group would show greater improvement following the intervention. However, three of 22 subtests is a limited sample so it is not possible to examine whether there is significance with an impaired group in entirety. Therefore, it would seem beneficial to compare this sample to a more impaired sample, preferably participants with diagnosed attention deficits to better assess BrM impact with impaired participants.

Also, BrM elected to administer the training in group sessions rather than individual sessions in order to complete the training in less than one year's time for the number of participants needed for the study. While in the planning of this study, BrM staff did not think group training would make a difference, it is possible that individual sessions would have resulted in greater gains. There is limited and varied research regarding the effectiveness of group vs. individual learning (Neber, Finsterwald, & Urban, 2001 & Stevenson, Friedrichs & Simpson, 1970). In general, the research results tend to be equivocal with respect to individual vs. group effectiveness.

Some might claim that how the intervention was administered is a limitation. That is, BrM intervention is not administered using the same intervention efforts across all participants because each participant proceeds at his/her own pace to master a training module before progressing to the next module. However, the majority of the programs including Cogmed use a

similar, client-paced remediation strategy (Beck et al., 2010; Chacko et al., 2013; Dunning et al., 2013; Holmes & Gathercole, 2013; Klingberg, et al., 2005; & Klingberg et al., 2002). Therefore, this is not considered an impactful limitation in this study.

The final hypothesis and data source intended for this investigation related to the participants' grades and standardized test scores obtained before and after BrM training. Unfortunately, it was difficult to obtain completed release of information forms, which were distributed at the end of the study, even though this component of the study was described in the consent form. A Release of Information was not collected during the informed consent meeting but should have been obtained at that time. Despite numerous attempts by email with a completed release form attached to obtain the grades and test results themselves, only 50% of the parents used the release form to have the grades sent to the researcher and only 12% used the form to have the state testing scores sent to the researcher. This resulted in a limited way to meaningfully examine the results. Future research should obtain the release form using the informed consent process at the outset of the study.

Conclusion

Taken overall, this study reveals BrM has limited impact on participant performance in the domains of short-term memory, self identity, attention and concentration, parent and trainer perceptions, and school grades. However, it is suggested further research measure the impact of BrM training on working memory more broadly to explore whether there may be impact in this cognitive area. Given that similar programs have shown improvement on visuo-spatial working memory, and this study revealed significance on the one subtest evaluating visual working memory, it is possible that BrM also has an impact on that cognitive domain. It is suggested that

future research explore the impact of BrM training on participants reliably diagnosed with ADHD and other conditions that are known to impair academic learning.

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Appendix A

Brighter Mind's descriptions of Modules 1-4 (BrM, Course Descriptions, 2009)

Brighter Mind's descriptions of Modules 1-4 (BrM, Course Descriptions, 2009)**Module 1 - Increasing Your Energy Level**

- **Motor Match**

You will become aware of mental processing glitches that cause frustration in life. You will implement powerful Life Approach Skills to overcome these glitches.

Lessons included in Module 1

1. Evaluating your potential for a high achievement breakthrough
2. Assessing your five critical brain processes
3. Brain food
4. The power of the electromagnetic brain
5. Human energy dials
6. Developing dendrite breakthroughs to expand the brain
7. Understanding mental blurs
8. Improving your memory
9. Attention and focus
10. Walking the Gauntlets of Life

Module 2 - Mental Imaging and Stamina

- **Motor Match Skills**

Your ability to visualize (i.e., eidetic imagery skills) will grow with new levels of stamina. You will learn to think and visualize desired outcomes before you act. This saves time and frustration.

Lessons included in Module 2

1. What to expect when you improve your diet
2. Simplicity
3. Communicating effectively under stress
4. Maintaining self control
5. The art of accomplishments; awareness, empathy, and stretching your limits
6. Changing habits; eliminating bad and creating good habits
7. The power of enthusiasm; the virtuous cycle
8. Managing stress under intensity
9. Adapting to pattern changes
10. Walking the Gauntlets of Life

Module 3 - Multi-tasking & Spatial Adeptness

Your brain will be quickened with improved memory and recall. You will realize you have the ability to multi-task on a new level, keeping track of multiple things at the same time. You will become more aware of your surroundings.

Appendix A cont.

Lessons included in Module 3

1. Optimum Sports Nutrition
2. Time Crunch Demands
3. Snap Decisions and Mental Blurs
4. Perseverance
5. The Power of Praise
6. Projecting Success
7. Evaluation Criticism
8. Managing Manipulation
9. Sensitivity; Reading Body Language
10. Walking the Gauntlets of Life

Module 4 - Conquering Gestalts

- Mental Stamina

Your brain is trained to process complex problems in situations where you normally experience mental blurs. A gestalt situation happens when several components or facets of a situation or problem blend together to become a single overwhelming problem.

Lessons included in Module 4

1. Gut Reactions / Instinct. Poor gut health is the number one cause of workplace sickness.
2. Optical Illusions
3. Mental Leverage
4. Personal Accountability
5. Personality Clashes
6. Power of Vocabulary in Leadership
7. Creating Eureka moments for solving problems
8. Integrity; Exposing Lies
9. Getting and staying in the Zone
10. Walking the Gauntlets of Life

Appendix B

Parent Questionnaire

Parent Questionnaire

Compared to others his/her age where would you rate this child on the following. Place a mark on the line nearest to the description that best fits your child.

Compared to others his/her age, my child's ability in the following is...

Example: Cartwheels

Worst I-----I Best

Memory

Worst I-----I Best

Behavior

Worst I-----I Best

Attention and Concentration

Worst I-----I Best

Grades

Worst I-----I Best

Appendix C
Trainer Questionnaire

Trainer Questionnaire

Compared to others his/her age where would you rate this child on the following? Place a mark on the line nearest to the description that best fits your trainee. If you are not sure leave it blank.

Compared to others his/her age, this child's ability in the following is...

Example: Cartwheels

Worst I-----I Best

Memory

Worst I-----I Best

Behavior

Worst I-----I Best

Attention and Concentration

Worst I-----I Best

Grades

Worst I-----I Best

Appendix D

Informed Consent Form

Informed Consent Form

BrM Training Program Study

Dear Parent or Guardian:

My name is Jenae Ulrich, M.A. I am a doctoral student in the Department of Clinical Psychology at George Fox University. I am working together with the staff at BrM to better understand how their service may help school-aged children improve memory, learning, attention, and academic functioning. During the testing period, your child will be asked to do things such as draw shapes, copy words, remember a series of numbers or pictures, and respond to a visual stimulus. To do this, I will give an assortment of tasks and questionnaires to each child prior to the start of the BrM training program. Your child will complete a second testing period either in the middle of the training or following the training, which includes various tasks and questionnaires. Each testing period will range from 90-120 minutes in duration. I will also give you two brief questionnaires to complete at the beginning of BM training and then two at the second testing period, each time the questionnaires will take about 20 minutes to complete. I will also collect the student's most recent grades and standardized test scores at the start of the program and at the end of the program.

Your child has the right to participate but it is not required, and he/she can stop at anytime without it affecting any services received by BrM. The purpose of this study will be to evaluate the Brighter Mind's model, and to empirically show whether there is a demonstrable change in cognitive functioning in several specific areas of program focus.

The participants will not be linked to any information obtained by name; therefore the results will be completely confidential. Confidentiality may be broken if for some reason you child suggests a risk of harming him/herself or others.

To thank the child for spending time doing these various tasks, your child will be given five-dollars at the end of the second testing period for helping out with this study. If there are any questions or concerns please contact Jenae Ulrich at julrich06@georgefox.edu or the supervisor of the research study, Dr. Wayne Adams at wadams@georgefox.edu.

 Parent or Guardian Signature

 Print Name and relationship

 Researcher Signature

 Date

Appendix E
ASSENT FORM

ASSENT FORM

BrM Training Program Study

My name is Jenae Ulrich, M.A. I am a student studying Clinical Psychology at George Fox University.

I am asking you to participate to better understand how BrM helps students perform better in school and at home.

If you agree, you will be asked to do many things such as drawing shapes, remembering numbers and pictures, and answering questions about yourself. These tasks will take about 90-120 minutes, which is about as long as two television shows. You do not have to put your name on the tasks or questionnaires. You can take a break at anytime during the testing period. Your agreement also allows the study to collect your grades reports and standardized test scores from last year and this year.

You do not have to be in this study. No one will be mad at you if you decide not to do this study. Even if you start, you can stop later if you want. If you finish all the things for the first and second meeting then you will be given five dollars. You may ask questions about the study.

If you decide to be in the study I will not tell anyone else what you say or how well you do or don't do. Even if your parents or teachers ask, I will not tell them about what you say or do; it is entirely private. However, your parents know you are helping out in this way, and it is okay with them.

Signing here means that I have read you this form and that you are willing to be in this study.

Signature of subject_____

Subject's printed name _____

Signature of investigator_____

Date_____

Appendix F

Cover Letter to homeroom teacher indicating the purpose for involvement

Cover Letter to homeroom teacher indicating the purpose for involvement

Dear Homeroom Teacher,

Your student, _____, is participating in a cognitive training program to help improve his/her academic functioning. The cognitive training program of which your student is enrolled is contracted with myself, Jenae Ulrich, M.A., as a third party researcher to help identify the specific areas in which their training helps students. Please take about 15 minutes to complete the BASC-2 Teacher Rating Scale on this student. Your cooperation would be greatly appreciated. Once finished please place the completed form in the attached envelope and return it to the researcher.

Sincerely and with great appreciation,

Jenae Ulrich, M.A.
Graduate Student of Clinical Psychology
George Fox University

Appendix G

WRAML Instructions: Design Memory

2. DESIGN MEMORY

MATERIALS
 Examiner Form
 Five Design Memory Cards
 Design Memory Response Form
 Pencils
 Stop Watch

START (FOR ALL PARTICIPANTS)
 Design Memory Card #1

DISCONTINUE
 Administer all 5 cards to all Participants

DIRECTIONS

8 & YOUNGER

Turn to the practice space on the Design Memory Response Form and say: **I would like you to draw this shape here** (pointing first to the upper, left shape and then the empty box beneath it), **this one here** (pointing to the next shape and then the corresponding empty box below it), **and the others in the correct places** (pointing with a sweeping gesture across the empty boxes). If there is apparent confusion about the task expectation, provide clarification that will result in the Participant's independent drawing of the shapes presented.

These copied reproductions will serve as approximate standards for judging accuracy of the future reproductions from memory. Visual-motor accuracy is not the important feature of this subtest. Memory for the designs displayed is the highlighted feature. This preliminary procedure may also be used with Participants of other ages if interpreting their drawing is deemed problematic. Conversely, if the Examiner has reason to believe that an 8-year-old or younger Participant has drawing ability which is adequate, so that the preliminary task is unnecessary, the task may be omitted.

When this preliminary task is completed, remove the pencil and proceed to the directions for all Participants.

ALL PARTICIPANTS

Say: **I am going to show you a card with some shapes. Then I am going to take the card away and have you try to draw the shapes that you saw. Try to remember where the shapes are so you can draw them in the correct place. That is, take a picture of the card in your mind. Be sure to look at the whole card.**

Place Card #1 on the table approximately 18 inches in front of the Participant. Following a 5-second exposure, remove the card. Allow 10 seconds to elapse between the time you remove the card and the

Appendix G cont.

WRAML Instructions: Design Memory cont.

Chapter 3 – Administration and Scoring

time you give the Participant a pencil. During this 10-second period supply the Design Memory Response Form and say (pointing to the appropriate area on the Response Form): **Now try to draw exactly what you saw on the card in the space here. Even if you do not remember everything, just draw what you can remember. Notice that the dotted lines are drawn for you.** Then give the Participant a pencil.

Upon completion of Card #1, take back the pencil, and say: **Here's the next one. Take a picture of it in your mind so you can draw it correctly. Be sure to look at the whole card.** Present Card # 2.

Continue in this fashion for all 5 cards. Be certain to expose each card for **exactly 5 seconds** and immediately thereafter provide an **exact 10-second delay** before allowing the Participant to start drawing.

For all cards, allow enough time for the Participant to draw a complete reproduction, but if the Participant is not responding for 10 seconds, say: **Let's finish up so that we can go on to the next one.**

If the shapes drawn by any Participant 9 years of age and older are difficult to decipher, the preliminary drawing task designated for those 8 years of age and younger may be used for clarification.

Care should be taken so the Participant does not see any of the cards other than during their single 5-second exposure.

An optional Design Memory Recognition subtest is available for use with this Core subtest. Administration guidelines are found as Subtest 6.

SCORING

Scoring criteria are found below. Abbreviated criteria for scoring each card are also provided within the Examiner Form. Each correct response is awarded one point. The total number of points earned across all 5 cards is the Total Score for this subtest.

Associated Optional Subtest

Design Memory Recognition

A description for the Administration and Scoring of this subtest is provided as Subtest 10.

Design Memory Scoring Criteria

The scoring system for the Design Memory subtest is constructed to be "Examiner friendly." However, it is necessary to provide enough detail in the scoring system so that scoring can be done with a high degree of consistency.

In scoring this subtest, should there be some question as to the accuracy of the produced drawing, the scoring should favor the Participant. Memory for the design and its placement are the essential components of this task, not drawing ability.

Unless specifically mentioned in the scoring criteria, do not score direction or rotation errors as incorrect. Several items specify either a vertical line, horizontal rectangle, etc. These items should be scored using the same guidelines as stated above. When there is ambiguity in the mind of the Examiner about the adequacy of the drawn design, score in the favor of the Participant.

On the Examiner Form there are scoring criteria for this subtest. These criteria are provided as a brief guideline of what is necessary to receive credit on any one item. The Examiner should interpret these criteria literally.

Appendix H

WRAML Instructions: Picture Memory

4. PICTURE MEMORY

MATERIALS
 Examiner Form
 4 Picture Memory Stimulus Cards
 (Zoo, Classroom, Garage, Living Room)
 Picture Memory Response Form
 Red China Marker
 Stop Watch

BEGIN
 Zoo Stimulus Card

DISCONTINUE
 Administer all 4 Stimulus Cards
 (Zoo, Classroom, Garage, Living Room)

DIRECTIONS

Say: I am going to show you a drawing that I want you to remember. Take a picture of it in your mind. Keep looking at all parts of the picture until I take it away.

There are 4 laminated Picture Memory Stimulus Cards (Zoo, Classroom, Garage, and Living Room). Expose the first Picture Card (Zoo) for **exactly 10 seconds**. After this 10 second exposure, remove the Zoo Picture Card and immediately present the corresponding altered scene found on the Picture Memory Response Form (Zoo), placing it on the table in front of the Participant. Care should be taken so the Participant does not see any of the other scenes on the form.

Say: Here is a picture like the one you have just seen. It is not exactly the same because some things have been changed, moved, or added. See if you can find the changes. With this marker put an "X" on each part of the picture that has been changed, moved, or added. Just mark the changes you are sure of. Go ahead. Give the Participant a marker.

If the Participant misses any of the 9 items on the Zoo stimulus card (*hot dog, balloon man, baby wolf, granite rocks, man's Hawaiian shirt, girl pushing carriage, giraffe, boy taking photo, cloud above stand*), return to the original Zoo Stimulus Card along with the altered scene from the Picture Memory Response Form. Show the Participant what has been moved, added, or changed. If the Participant marked something incorrectly, point out the error(s) to the Participant (e.g., "This one stayed in the same place"). Regardless, score items as originally marked. Note that the Zoo scene is the only stimulus card for which this correction procedure occurs. Proceed to the next item.

Say: Now I will show you another picture, but I am not allowed to give any more help. Look carefully at each picture I show you because I'll again ask you to remember what has been changed, moved, or added in each picture. Expose the second stimulus card (Classroom) for **exactly 10 seconds**.

Remove the card and immediately provide the Participant the corresponding scene on the Picture Memory Response Form. Say: Put an "X" on each part of the picture that has been changed, moved, or added. Be sure to mark only those items you are sure of.

Appendix H cont.**WRAML Instructions: Picture Memory cont.***Chapter 3 – Administration and Scoring*

If the Participant makes random responses which appear to be guesses, the Examiner should remind the Participant to mark only the ones he/she is sure of. An incorrect response (mark) is called a Commission Error.

After the Participant has completed the second stimulus card, present each of the remaining Picture Cards in the same manner, saying: **Here is the next one. Remember to look at all parts of the picture.** Again expose each Picture Card for **exactly 10 seconds**, then remove it and immediately provide the Participant with the corresponding scene on the Picture Memory Response Form using the directions provided for the first two stimulus cards. For the third and fourth stimuli, directions may be abbreviated if the Participant clearly understands the task.

Be sure to observe the Participant's responses while he/she is marking the Picture Memory Response Form. If it is unclear what the Participant intended to mark, ask the Participant to clarify, upon completion of the item.

Usually the Participant will finish responding to each picture within 30 seconds or less. If a Participant is not actively responding, ask if he/she has finished. Allow as much time as needed to obtain all the Participant's responses, but as a "rule of thumb" when the Participant does not respond within 10 seconds, indicate that it is necessary to move on to the next one.

DISCONTINUE

Administer all 4 Picture Memory Stimulus Cards to all Participants.

SCORING

Record the correct responses on the Examiner Form. Participants receive one point for each correctly identified item on each Picture. The total number of points earned for all 4 Pictures comprises the Total Score for this subtest.

Associated Optional Subtests and Qualitative Analyses**Commission Errors**

A Commission Error occurs when the Participant erroneously marks an element that has not been "moved, changed or added." The sum of the Commission Errors made on all cards is the Commission Error Total Score. **Note:** Commission Errors do not alter the Total Score for Picture Memory.

Picture Memory Recognition

A description for the Administration and Scoring of this subtest is provided as Subtest 11.

Appendix I

WRAML Instructions: Finger Windows

7. FINGER WINDOWS

MATERIALS
 Examiner Form
 Finger Windows Card
 Pencil

BEGIN
 8 & YOUNGER: Item A
 9 TO ADULT: Item 4

DISCONTINUE
 3 Consecutive Errors

DIRECTIONS

Place the Finger Windows Card on the table approximately 12 inches in front of the Participant. Make sure that when you hold the card perpendicular to the table, your fingers are near the edge of the card, and they do not block any of the "windows". The printed side should face the Examiner. At no time should the Participant be allowed to see the printed side of the Finger Windows Card.

Say: **This card has holes like windows. I am going to put the end of my pencil into one window and then another. When I am done, I want you to do the same thing with your finger. Let's try one. Wait until I say "Begin" before you start.**

With the eraser end of a pencil, touch through the windows associated with the initial item and then say "Begin." Use the eraser end of a pencil consistently throughout the subtest. The pencil should be touched on the bottom edge of the window with 1/2 inch of the pencil passing through the window. Upon request, it is permissible to give a pencil to the Participant to imitate the Examiner's presented sequence.

The Examiner's pencil should be inserted in and removed from each window in one second. To maintain a uniform rate from one window to another, the Examiner may want to touch the bottom edge of the window with the pencil and then bring his/her hand or pencil to rest momentarily on the table behind the card before moving on to the next window. The Participant is not required to rest his/her hand on the table between windows.

On the second item, say: **Now put your finger in the same windows that I touch this time. Be sure to do it in the same order that I do it, and wait until I say "Begin."** These directions can be abbreviated or eliminated once the Participant clearly understands the task.

If a Participant aged 8 & younger responds incorrectly on Items A, B, or C, the Examiner should correct the item and "teach" the procedure. Repeat Items A, B, and C as often as necessary to be sure that the Participant understands the correct way to respond, then continue with Item 1. **Score the item as incorrect if the Participant needs this extra help on Items A, B, or C.** Give no further help on any subsequent items.

Appendix I cont.**WRAML Instructions: Finger Windows cont.***WRAML2 Manual*

If a Participant aged 9 to adult misses # 4 (which is the first item presented to him/her), return to Item A. Teaching is permitted on Items A, B, and C to ensure the Participant understands the task. Do not readminister Item # 4, but continue until the Discontinue Rule is satisfied.

Administer items consecutively using the sequences which appear on the Examiner Form as well as on the back of the Finger Windows Card. Discourage the Participant from verbalizing while observing or performing the task (e.g., "This is a quiet task").

DISCONTINUE

Discontinue after 3 consecutive errors.

SCORING

Award one point for each correct sequence. For Participants not taking Items A, B, C, 1, 2, and 3, give full credit (6 points) for these items. The total number of correct sequences constitutes the Total Score for this subtest.

Appendix J

WRAML Instructions: Number Letter

9. NUMBER LETTER**MATERIALS**
Examiner Form**BEGIN**
Item #1 for all Participants**DISCONTINUE**
3 consecutive incorrect items**DIRECTIONS**

The items should be read from the Examiner Form at a rate of 1 number/letter per second. The Examiner's voice should drop slightly when reciting the last element of an item to signal the end of that item. All other elements are recited with equal inflection.

Say: **I am going to say some numbers and letters. Listen carefully because I will ask you to repeat them to me. I can say them only once. It is alright to guess. Say, 3.**

If the Participant is correct, give positive feedback and then go on to the next item.

If the Participant is incorrect on the first or second item, say: **That's not quite right. I said "3." Remember to say it just the way I do.** Go on to the next item.

Give no further assistance after Item # 2.

DISCONTINUE

Discontinue after 3 consecutive incorrect items.

SCORING

One point is given for each totally correct response.

Appendix K

WRAML Instructions: Sentence Memory

15. SENTENCE MEMORY

MATERIALS
 Examiner Form

BEGIN
 8 & YOUNGER: Item 1
 9 TO ADULT: Item 8

DISCONTINUE
 3 consecutive zero-point responses
DIRECTIONS

I am going to read you some sentences. Listen carefully, because I want you to say them back just the way I said them. I can say my sentences only once. If you are not sure of all the words, just take a guess. Ready?

For Participants 8 and younger, say: I run.

For Participants 9 to adult, say: **They have a new baby named Juan.** (hwān)

If the Participant responds correctly, say **Good! Let's try another.** Proceed with subsequent consecutive items found on the Examiner Form. If a Participant aged 8 years and younger does not correctly repeat Item # 1, teach this item until confident that the Participant understands the task. If a Participant 9 years to adult does not correctly repeat Item # 8, proceed to Item # 1. Do not give credit for the item if Participant was incorrect on the first try. Continue consecutively with the remaining items but provide no additional teaching. Items should be read with a relaxed "story reading" rate, rhythm and inflection.

SCORING

Use the Examiner Form to record the Participant's response. For subsequent clinical review it is often useful to record the child's incorrect responses above the sentence presented. For all items, award two points if the item is entirely correct, one point if the Participant makes one error, and zero points if the Participant makes two or more errors. The total sum of earned points constitutes the Total Score for this subtest.

Responses are to be scored strictly. Each additional word not found in an item is counted as an error. An omission of any word in an item is counted as an error. Any change of a word, such as tense, pronoun gender or singular/plural is also counted as an error. Changing two words (e.g., They have) to a contracted form (They've) is counted as one error. Apparent changes because of local accent or common colloquial renderings (e.g., "liked to jog" repeated as "liked ta jog") are not considered errors.

Appendix L

WRAVMA Instructions: Drawing (Visual-Motor) Test Directions

Drawing (Visual-Motor) Test Directions

Directions

3 - 5 Years
Start with Item 1

ITEM 1. Turn to the first page of the WRAVMA Drawing Test and say:

We are going to do some drawing. This man has 2 balloons, and they need some strings. I'll make this one.

Draw a line from the blue balloon to the man's right hand. Then point to the green balloon. Say:

Now you do this one.

Do not make a vertical motion; just point to the green balloon. Then give the child the thick pencil you were using, and encourage him/her to begin drawing. If the child is successful, praise his/her efforts and proceed to the next item. If the child is unsuccessful or seems confused, repeat the directions and illustrate the task again, retracing your previous "string." If the child is still unsuccessful, show the child how the second balloon's string would be drawn, and proceed to the next item. All attempts, even if not successful, should be praised for Items 1-3, and succeeding items as seems appropriate. Score the child's first attempt only.

ITEM 2. While taking back the child's pencil, point to Item 2 and say:

Here is a train riding on a train track. We need to finish the track. I'll do this one.

Draw the *upper* unfinished track, from the left endpoint to right endpoint. Point to the left endpoint of the *lower* left track, and return the pencil to the child. Say:

There, now you draw this one.

Do not make a horizontal motion. If the child is successful, proceed to the next item. If the child is unsuccessful or seems confused even after the redrawing of the examiner's section of track and repeating the directions, show the child how the track should be drawn, and proceed to the next item. Score the child's first attempt only.

ITEM 3. Again, take back the child's pencil and say:

Here is a funny looking car. I am going to draw one of the tires.

Draw the front tire. Then return the pencil to the child and pointing to the back tire area, say:

Now you draw this one.

Do not make a circular motion. If the child is successful, proceed to the next item. If the child is unsuccessful or seems confused even after redrawing the front tire and repeating the directions, show the child how the back tire should be drawn, and proceed to the next item.

Appendix L cont.

WRAVMA Instructions: Drawing (Visual-Motor) Test Directions cont.

Drawing (Visual-Motor) Test Directions

Score the child's first attempt only.

Open the Drawing Booklet so Items 4 - 7 are showing (Item 4 at the child's extreme left, with the Booklet's crease directly in front of the child).

Now we have some shapes to draw.

Pointing to the design associated with Item 4, say:

Try to draw one like this down here (pointing to the space below Item 4).

Continue similarly for the remainder of the items. As each page of items has been completed, turn to the next page. Directions may be abbreviated or omitted once the child understands the task.

6 - 9 Years
Start with Item 4

Turn to the fourth page of the WRAVMA Drawing Test Booklet. It should be oriented with Item 4 to the child's extreme left with the Booklet's crease directly in front of the child. Pointing to the design associated with Item 4 say:

We are going to do some drawing. Try to draw one like this (pointing to the design) **down here** (pointing to the empty box below the design).

Continue similarly (i.e., "Try to draw one like this...") for the remainder of the items. As each page of items has been completed, turn to the next. The directions may be abbreviated or entirely omitted once the child understands the task. If the child succeeds with Item 4, he/she is credited for Items 1 - 3 as if he/she had drawn them successfully. If the child is unable to draw Item 4 correctly, return to Item 1, and proceed as indicated. Do not re-administer Item 4; but proceed to Item 5 if the discontinue rule has not yet been satisfied.

10 - 17 Years
Start with Item 8

Turn to the sixth page of the WRAVMA Drawing Test Booklet. It should be oriented with Item 8 to the child's extreme left with the Booklet's crease directly in front of the child. Use the same procedure and instructions given above. If the child succeeds with Item 8, he/she is credited for Items 1-7 as if he/she had drawn them successfully. Proceed to subsequent items until the discontinue rule is satisfied. If the child does not successfully draw Item 8, return to Item 4. Do not thereafter re-administer Item 8; but proceed to Item 9 if the discontinue rule has not yet been satisfied.

Discontinue

Discontinue after 3 consecutive failed items.

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Appendix M

WRAVMA Instructions: Matching (Visual-Spatial) Test Directions

Matching (Visual-Spatial) Test Directions

MATCHING (VISUAL-SPATIAL) TEST

KEY DIRECTIONS

1. NO ERASURES
2. START: 3-6 YEARS ITEM 1
7 & UP ITEM 6
3. STOP WHEN 6 OUT OF 8 ITEMS ARE INCORRECT
4. ENCOURAGE CHILD TO DO HIS/HER BEST

DIRECTIONS

3 - 6 Years
Start with Item 1

Show the child the first page of the Matching Booklet. Pointing to the antlered deer in the left box (Item 1), say:

See this? (Pointing to the antlered deer at the top). **Which one from down here** (pointing to the selections below with a rotating movement around the four figures) **goes best with this one?** (again pointing to the top antlered deer). **Put a mark on the one** (pointing to the four options with a rotating movement) **that goes best with this one** (pointing to the standard).

Give the child the marker or crayon, and encourage the child to make a line or "X" on the correct choice. If the child is tentative or seems confused, repeat the directions and encourage a response. The child need only to mark enough to identify his/her choice. The examiner may help the child mark his/her choice if help seems necessary. If the child is correct, take back the marker or crayon, praise the child and proceed to Item 2. If the child is incorrect say:

Appendix M cont.

WRAVMA Instructions: Matching (Visual-Spatial) Test Directions cont.

Matching (Visual-Spatial) Test Directions

No, that's not right. See, it is this one (pointing to the antlered deer in the lower box). This one goes best with the one up here. (Again point to the deer in the upper box). Now you put a mark on the one which goes best with this one.

Avoid verbal explanations of why an alternative is correct or incorrect. Score the child's first choice only. If a child seems to be randomly marking items, encourage him/her to "take your time and be sure to find the one that goes best with the one on top."

Proceed to Item 2. Say:

Here's the next one. It is like a puzzle. See (pointing) a piece is missing. Which piece goes best with this one? (pointing to where the "piece" would "fit").

Give the child the marker or crayon and encourage a choice. If the child is tentative or seems confused, repeat the directions and encourage a response. If the child is correct, praise the child, turn the page, and proceed to the next item. If the child is wrong say:

No, that's not right. See, it is this one (pointing to the correct alternative). This piece goes best here (pointing to the standard). Now you put a mark on the one which goes best with this one.

Avoid verbal explanations of why an alternative is correct or incorrect. If the child is still unsuccessful, proceed to the next item. Score the child's first choice only.

Proceed to Item 3 and subsequent items. Say:

Now try this one.

Continue to use variations of the above directions as appropriate. When the child understands what is expected, the directions may be abbreviated or omitted. It is permissible to mention to the child that choices often do not exactly match the model as you encourage selecting a choice that *goes best with* the standard. Since the second "puzzle" item does not appear until Item 19, reiteration of this last section will likely be helpful should the child advance to that item.

If the child seems concerned about his/her performance, indicate that some of the items are for older children and no one is expected to get all the items correct. While there are no time limits on items, if the child seems "stumped," encourage the child to guess and move on to the next item.

7 Years & Up
Start with Item 6

Show the child the third page of the Matching Booklet. Pointing to the boot in the upper left box (Item 6) say:

See this? (pointing to the boot at the top). Which one from down here (pointing to the possible selections below with a rotating movement around the four choices) goes best with this one? (again pointing to the top boot). Put a mark on the one (pointing to the four options with a rotating movement) that goes best with this one (pointing to the standard).

Appendix M cont.

WRAVMA Instructions: Matching (Visual-Spatial) Test Directions cont.

Matching (Visual-Spatial) Test Directions

Give the child the marker or crayon and encourage the child to make a line or "X" on the correct choice. If the child is tentative or seems confused, repeat the directions and encourage a response. If the child is correct, praise the child, and proceed to the next item, and similarly for the subsequent items until the discontinue rule is met. If the child succeeds with Item 6, he/she is credited for Items 1-5, as if he/she had completed them successfully.

If the child misses Item 6 say:

No, that's not right. See, it is this one (pointing to the correct alternative). **This one goes best with the one up here** (pointing to the standard). **Now put a mark on the one which goes best with this one. Score the child's first choice only.** If the child fails the starting item (Item 6), return to Item 1, and proceed as indicated in the previous section. Do not re-administer Item 6, but proceed to Item 7.

Continue to use variations of the above verbal directions as appropriate. Once the child understands what is expected, the directions may be abbreviated or omitted. It is permissible to mention to the child that choices often do not exactly match the model as you encourage selecting a choice that **goes best with** the standard.

Should the child advance to Item 19 (squirrel), *before* administering the item say:

This next one is a little different. It is like a puzzle. See, (pointing to the empty rectangle on the face of the squirrel) **a piece is missing. Which piece goes best with this one?** (Pointing to where the piece would fit.)

If the child seems concerned about his/her performance, indicate that some of the items are for older children and no one is expected to get all the items correct. While there are no time limits on items, if the child seems "stumped," encourage the child to guess and move on to the next item. Throughout, a child may spontaneously change his/her response to an item; in such cases, score the final choice.

In all cases, avoid verbal explanations of why an alternative is correct or incorrect. If a child seems to be impulsively or randomly marking these or subsequent items, encourage him/her to "take your time and be sure to find the one that goes best with the one on top."

Discontinue

Discontinue after 6 incorrect out of 8 consecutive items.

Scoring

Record the child's responses in the spaces provided on the Examiner's Form. Correct answers are indicated there for each item. Also, next to each item are symbols. Circle the symbol if the child's response is correct; cross out the symbol if the child's choice is incorrect. Discontinue when 6 out of 8 consecutive items are crossed out. Calculate the Matching Test Raw Score by adding the total number of correct responses prior to the ceiling item. For ease of scoring, symbol sequences are repeated in blocks of eight. For example, if a child's first error is on a "+" (such as Item 8), six crossed out responses must be recorded at or before reaching the next "+" symbol (Item 15) in order to discontinue.

Appendix N

WRAVMA Instructions: Pegboard (Fine Motor) Test Directions

Pegboard (Fine Motor) Test Directions

PEGBOARD (FINE MOTOR) TEST

KEY DIRECTIONS

1. DOMINANT HAND FIRST
2. 3 + 3 TRAINING (LEFT AND RIGHT HANDS)
3. NO SKIPPING HOLES
4. ONE PEG AT A TIME
5. 90 SECONDS EACH HAND
6. ENCOURAGE CHILD TO WORK QUICKLY

Directions

Remove the lid covering the pegboard storage bin.

Place the pegboard on the table with the peg bin oriented toward the child. However, for the demonstration phase, the pegboard should be closer to the examiner sitting across the table from the child. Identify the child's dominant hand; it will be the preferred hand used during the WRAPMA Drawing and/or Matching Tests.

Say:

Watch how I put some pegs in this board.

With the child watching, pick up one peg from the peg bin and place it accordingly: if the child is right handed, place the peg in the hole farthest to the examiner's right, and in the row closest to the examiner; if the child is left handed, place the peg in the hole farthest to the examiner's left, and in the row closest to the examiner. Place a second and then a third peg in the row. Note that from the child's perspective, a right-handed child will see three pegs put in the top row in a left to right direction. The left handed child will see three pegs put in the top row in a right to left direction. Having placed the three pegs, say:

Now it's your turn. Use the hand you write with.

Appendix N cont.

WRAVMA Instructions: Pegboard (Fine Motor) Test Directions cont.

Pegboard (Fine Motor) Test Directions

For all younger children and those older children who may be unsure, touch the dominant hand and add:

This hand will work first; this hand (touching the non-dominant hand) will rest. It can't help.

Encourage all children to place the resting hand in his/her lap or pocket, then say:

For practice, put a few pegs in this row, one right after the other (point to the fourth hole of the row started by the examiner). Pick up only one peg at a time, and don't skip any holes.

Move the pegboard closer and directly in front of the child so that obtaining and placing pegs will be comfortable. For most children, the board will be positioned 6 to 12 inches from the edge of the table, depending upon the child's reach. Do not allow the child to touch the pegs until the instructions are completed.

Allow the child to place three pegs for practice, following the examiner's three pegs. Interact with the child as needed so the examiner is confident that the child understands the "rules" (i.e., use only one hand, don't skip holes, one peg at a time).

RIGHT HAND ADMINISTRATION

CHILD

LEFT HAND ADMINISTRATION

CHILD

Appendix N cont.

WRAVMA Instructions: Pegboard (Fine Motor) Test Directions cont.

Pegboard (Fine Motor) Test Directions

For the youngest children, complying with all rules initially may be difficult. The most common problem is the young child's tendency to use both hands. If the examiner is vigilant and prevents the non-dominant hand to be used initially, the child quickly adapts. Some younger children tend to place pegs vertically or stop at the end of the top row. A quick reminder of the procedure is usually sufficient to help the child proceed appropriately. Occasionally a child will want to select pegs of just one color. This should be corrected by the child being told to "use all the colors."

Throughout the task, if a peg is dropped off the board, the examiner should quickly obtain it and hold on to it. Encourage the child to obtain an alternate peg and continue to work. If the child picks up more than one peg, immediately remind him/her that placing only one peg at a time is permitted and quickly guide the child's hand back to the peg bin to deposit the extra pegs if the child does not do so spontaneously after the verbal reminder. If the child inadvertently knocks out a peg that has been already placed, tell the child not to worry about it and to go on placing more pegs. The examiner should immediately replace the dislodged peg once it is not disruptive to do so.

Upon completion of the practice phase, *remove all pegs to the storage bin*. Proceed to the following directions which should be said with a noticeable pause after each component of the instructions. Say:

Good. Now when I say begin, see how many pegs you can put in until I say stop. Remember, only use this hand (pointing to the dominant hand). **Start here** (pointing to the first hole the examiner started with) **and put pegs in the holes of this row** (motioning from the beginning to the end of the first row). **If you finish this row, go on to the next row** (pointing to the hole under the first and motioning to the second row in the same direction as the first). **Keep working like this** (motioning on the third and fourth rows in the same direction as the first and second) **until I say stop. Remember, work as quickly as you can. Don't skip any holes. Pick up only one peg at a time. Any questions?** If none, say: **Begin**. Start timing when the child touches the first peg. *Allow 90 seconds and then say: STOP.*

If the child has questions answer them. Then repeat the instructions in the prior paragraph and proceed. The examiner should quickly correct the child whenever any aspect of the procedure is violated in order to ensure the task is done properly. Record the total number of pegs inserted in 90 seconds. [For ease of counting, note that each row has 10 holes.] This Dominant Hand score should be used for determining the standard score for the Pegboard Test.

If the examiner wishes, the Non-Dominant Hand can be assessed as follows. Move the pegboard closer to the examiner, remove the pegs to the peg bin. Say:

That was good. Now we are going to do it again, but this time you will use your other hand. Let's do some for practice.

Insert three pegs in the top row in a similar manner as the dominant hand, except this time do them in the opposite direction. That is, for a right-handed child (who now will be using his/her left hand), the examiner should place the pegs in the top row (from the child's perspective) in the holes farthest to the right. For a left-handed child (who now will be using his/her right hand), the examiner should place the pegs in the top row (from the child's perspective) in the holes farthest to the left. Then say:

Appendix N cont.

WRAVMA Instructions: Pegboard (Fine Motor) Test Directions cont.

Pegboard (Fine Motor) Test Directions

Now it is your turn. For all younger children who may be unsure add: **This hand works** (pointing to the non-dominant hand) **and this hand rests** (pointing to the dominant hand). **Try putting in some pegs in this row** (pointing to the fourth hole of the row started by the examiner). **Just like before, pick up only one peg at a time. Don't skip any holes.**

Move and orient the board closer to the child as before, and allow the child to insert three pegs for practice. Interact with the child as needed so the examiner is confident the child understands the rules. It may be necessary to have the child place his dominant hand in his lap (or pocket). Upon completion of this second practice phase, remove all the pegs to the peg bin. Proceed with the following directions which should again be said with a noticeable pause after each component of the procedure.

Good. Now when I say begin, put in as many pegs as you can until I say stop. Remember, only use this hand (pointing to the non-dominant hand). **Start here** (pointing to the first hole the examiner started for the second demonstration) **and put in one after the other** (motioning from the beginning to the end of the first row). **See, this time we move in the opposite direction** (motioning). **If you finish this row, go on to the next one here** (pointing to the hole under the first and motioning on the second row in the same direction as the first). **Keep working like this** (motioning on the third and fourth rows in the same direction as the first and second) **until I say stop. Remember, work as quickly as you can. Don't skip any holes. Pick up only one peg at a time. Any questions?**

If there are no questions, say: **Begin.** Begin timing when the child touches the first peg. *Allow 90 seconds* and say: **Stop.** If the child has questions answer them; then repeat the instructions in the prior paragraph and proceed. As before, the examiner should correct the child when any aspect of the procedure is violated, to ensure the task is done properly.

Scoring

Record on the Examiner Form the total number of pegs inserted in 90 seconds for the dominant hand. A comparison between dominant and non-dominant hand fine-motor skill can be made from tables in Chapter 6. Note that only the Dominant Hand Raw Score is recorded on the front of the Examiner Form to calculate the Fine Motor standard score and Composite Score.

Appendix O

BASC Instructions for Teacher Form (Instructions are the same for all ages).

<h1 style="margin: 0;">BASC-2</h1> <p>Child's Name _____ <small>First Middle Last</small></p> <p>Date _____ Birth Date _____ Age _____ <small>Month Day Year Month Day Year</small></p> <p>School _____ Grade _____</p> <p>Sex: ☐ Female ☐ Male Other Data _____</p> <p>Instructions: On both sides of this form are phrases that describe how children may act. Please read each phrase, and mark the response that describes how this child has behaved recently (in the last several months).</p> <p>Circle N if the behavior never occurs. Circle S if the behavior sometimes occurs. Circle O if the behavior often occurs. Circle A if the behavior almost always occurs.</p> <p>Please mark every item. If you don't know or are unsure of your response to an item, give your best estimate. A "Never" response does not mean that the child "never" engages in a</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> Teacher Rating Scales— Adolescent Computer-Entry Form </div> <div style="border: 1px solid black; padding: 5px; float: right; text-align: center;"> TRS-A Ages 12–21 </div> <div style="clear: both;"></div> <p>Behavior Assessment System for Children, Second Edition Cecil R. Reynolds, PhD, and Randy W. Kamphaus, PhD</p> <p>Your Name _____ <small>First Middle Last</small></p> <p>Position _____</p> <p>What type of class do you teach? _____</p> <p>How long have you known this child? _____</p> <p>behavior, only that you have not observed the child to behave that way.</p> <p>How to Mark Your Responses Be certain to circle completely the letter you choose, like this:</p> <p style="text-align: center;">N S O A</p> <p>If you wish to change a response, mark an X through it, and circle your new choice, like this:</p> <p style="text-align: center;">N S A</p> <p>Before starting, be sure to complete the information above these instructions.</p>
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Appendix P

BASC Instructions for Parent Scales (Instructions are the same for all age ranges)

Parent Rating Scales—
Child
Computer-Entry Form

PRS-C
Ages
6-11

BASC-2™

Behavior Assessment System for Children, Second Edition

Cecil R. Reynolds, PhD, and Randy W. Kamphaus, PhD

Child's Name _____	Your Name _____
Date _____ Birth Date _____	Sex: ☐ Female ☐ Male
School _____ Grade _____	Relationship to Child: ☐ Mother ☐ Father
Sex: ☐ Female ☐ Male Age _____	☐ Guardian ☐ Other _____
Other Data _____	

Instructions:

On the pages that follow are phrases that describe how children may act. Please read each phrase, and mark the response that describes how this child has behaved recently (in the last several months).

Circle **N** if the behavior **never** occurs.

Circle **S** if the behavior **sometimes** occurs.

Circle **O** if the behavior **often** occurs.

Circle **A** if the behavior **almost always** occurs.

Please mark every item. If you don't know or are unsure of your response to an item, give your best estimate.

How to Mark Your Responses

Be certain to circle completely the letter you choose, like this:

N **S** O A

If you wish to change a response, mark an X through it, and circle your new choice, like this:

N **X** **S** O A

Before starting, be sure to complete the information in the boxes above these instructions.

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PsychCorp
Product Number 30034

PRS-C Ages 6-11

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Appendix Q

BASC Instructions for child self-report form (instruction are the same for all ages)

Self-Report-Child
Computer-Entry FormSRP-C
Ages
8-11**BASC-2**TM

Behavior Assessment System for Children, Second Edition

Cecil R. Reynolds and Randy W. Kamphaus

Your Name _____ Date _____ Birth Date _____
First Middle Last Month Day Year Month Day Year
 School _____ Grade _____ Sex: ☐ Girl ☐ Boy
 Age _____ Other Data _____

Directions:

This booklet contains sentences that tell how some boys and girls think or feel or act. Read each sentence carefully. For the first group of sentences, you will have two answer choices: T or F.

Circle **T** for **True** if you agree with a sentence.

Circle **F** for **False** if you do not agree with a sentence.

Here is an example:

1. I like dogs. ☒ T ☐ F

For the second group of sentences, you will have four answer choices: N, S, O, and A.

Circle **N** if the sentence **never** describes you or how you feel.

Circle **S** if the sentence **sometimes** describes you or how you feel.

Circle **O** if the sentence **often** describes you or how you feel.

Circle **A** if the sentence **almost always** describes you or how you feel.

Here is an example:

2. I like doing homework. N ☒ S ☐ O ☐ A

If you wish to change an answer, mark an X through it, and circle your new choice, like this:

2. I like doing homework. N ☒ S ☒ O ☐ A

Give the best answer for you for each sentence, even if it is hard to make up your mind. There are no right or wrong answers. Please do your best, tell the truth, and answer every sentence.

Before starting, please fill in the information in the box above these directions.

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Product Number 30037

SRP-C Ages 8-11

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Appendix R

Conners' CPT-II Instructions for Administration

Conners' CPT-II Instructions for Administration

Step 1: Obtain Informed Consent

Step 2: Assure Confidentiality

Step 3: Administer Practice Test

Standard electronic protocol includes a short practice test prior to administration of the CPT II. Electronic administration includes directions, once the administrator is certain the task is understood he or she can say, "Okay, I think you've got the idea, now let's start the full program".

Step 4: Administer the CPT II

The instructions appear once more on the screen. The administrator may reiterate the instructions verbally to the participant. The administrator should say, "Please remember to respond as fast as you can, but also as accurately as possible". The standard protocol requires the administrator to remain unobtrusively present during administration. If the participant asks the administrator a question during administration, the administrator should respond, "I can answer that after you are finished. Please continue." If the participant is off-task in any way the administrator can provide only one verbal prompt such as, "Please be sure to press the Spacebar whenever you see any letter except the X."

If the participant becomes off-task again, no further prompts are to be made.

(Conners, 2010)

Appendix S

WIAT-III Scoring Criteria used for Handwriting Copy Task

WIAT-III Scoring Criteria used for Handwriting Copy Task

Sentence for Handwriting Copy Task:

The quick brown fox jumps over the lazy dog. Then he runs to the chicken coop trying to steal a meal.

Administration:

First, provide the participant with the piece of paper with the sentence and available lines and a pencil with an eraser. **I am going to show you a sentence. When I say begin, copy the sentence exactly as it is written. Copy the sentences as fast as you can and tell me when you are finished. If you make a mistake you may fix it, but remember to work as quickly as you can. Begin.** Use a timer to record the amount of time it takes for the participant to finish the sentences.

Scoring Criteria:

1. Time taken to copy the sentence.
2. Number of words not present? Please note all.
3. Number of words misspelled? Please note all.
4. Number of letters reversed? Please note all.
5. Number of letters or words poorly formed (illegible)? Please note all.
6. Number of punctuation missing or incorrectly marked? Please note all.
7. Number of errors regarding capitalization. Please note all.
8. Number of commissions? Please note all.

Add all errors to score handwriting copy task.

Appendix T
Curriculum Vitae

Jenae M. Ulrich, M.A.

6016 N. Denver Ave. ♦ PORTLAND, OR 97217
PHONE (503)-899-0102 ♦ EMAIL julrich@georgefox.edu

EDUCATION

- Doctoral Candidate of Clinical Psychology, Psy.D.
2009 – Present (Anticipated graduation: May 2014)
Graduate Department of Clinical Psychology (APA Accredited)
George Fox University, Newberg Oregon
- Master of Arts, Clinical Psychology, 2011
Graduate School of Clinical Psychology (APA Accredited)
George Fox University, Newberg, Oregon
- Bachelor of Arts, Psychology 2008
George Fox University, Newberg, Oregon
Magna Cum Laude

SUPERVISED CLINICAL EXPERIENCE

- **Predoctoral Intern at Providence Medical Group, Portland, Oregon**
08/2013 – Present
Supervisor: Vanessa Casillas, PsyD
Currently under review for APA-accreditation
Duties:
 - Provide individual Behavioral Health psychotherapy services to clinic patients of all ages and diagnoses.
 - Consult with a variety of professionals within and outside the clinic regarding diagnosis clarification and treatment planning.
 - Administer assessments and write reports for a variety of patient needs including diagnosis and treatment planning.
 - Provide supervision to a 3rd year PsyD student seeing clients at the George Fox University Behavioral Health Clinic.
 - Participate in case consults with peers, didactic trainings, and present cases and trainings occasionally throughout the training year.
- **Graduate TA at George Fox University, Newberg, Oregon**
08/2012 – 04/2013
Supervisor: Carlos Taloyo, PsyD
Duties:
 - Provide supervision to four 1st year PsyD students in Clinical Foundations Course.

- Review taped videos of therapy and provide feedback in written, 1:1, and group settings.
 - Grade and provide feedback on student papers and reflections of Client-Centered skills.
 - Conduct group instruction relevant to each weeks teaching and current training goals.
- **Graduate Oversight Mentor**, Newberg, Oregon
 08/2012 – 04/2013
 Supervisors: Carlos Taloyo, PsyD and Joel Gregor, PsyD
 Duties:

 - Provide 1:1 supervision and mentorship to 2nd year PsyD student.
 - Discuss personal and professional development as it relates to Clinical Psychology training.
 - Mentor and guide individualized training goals related to Clinical Psychology Competency Goals.
- **Practicum Student at Oregon Health and Sciences University Family Medicine Clinic**, Scappoose, Oregon
 06/2011 – 07/2013
 Supervisor: Tami Hoogestraat, PsyD, MBA
 Duties:

 - Provide individual Behavioral Health psychotherapy services to clinic patients of all ages and diagnoses.
 - Consult with a variety of professionals within and outside the clinic regarding diagnosis clarification and treatment planning.
 - Administer assessments and write reports for a variety of patient needs including diagnosis and treatment planning.
- **Undergraduate TA at George Fox University**, Newberg, Oregon
 08/2011 – 12/2011
 Supervisor: Kristina Kays, PsyD
 Duties:

 - Provided supervision for four undergraduate students enrolled in Advanced Counseling.
 - Facilitated group learning of Advanced Counseling course terminology and Active Listening Skills.
 - Watched video-taped therapy sessions and provided feedback in writing and at 1:1 meetings.
 - Consulted with three graduate level students and the professor regarding supervision of student learning and development.
- **North Clackamas School District**, Milwaukie, Oregon
 08/2010 – 06/2011
 Supervisor: Fiorella Kassab, PhD

Duties:

- Provided individual psychotherapy services to adults ages 18-21 with developmental disabilities.
- Provided group psychotherapy using social skills training and coping strategies as a focus.
- Administered assessments and wrote reports for the purposes of special education eligibility and adaptive behavior evaluations for students within the school district aged 7-21.
- Consulted with a variety of professionals within and outside of the school system and student guardians.

- **George Fox University**, Newberg, Oregon

01/2010 – 04/2010

Pre-Practicum II

Supervisors: Mary Peterson, Ph.D. and Rikki Mock, M.A.

Duties:

- Provided outpatient individual psychotherapy services to volunteer young adult university students.
- Conducted intake interviews, prepared treatment plans, and wrote reports with diagnoses and relevant history.
- Created professional reports, presenting case conceptualizations.
- Consulted with supervisors and members of clinical team.
- All sessions were taped, reviewed, and discussed in individual and group supervision.

- **George Fox University**, Newberg, Oregon

09/2009 – 12/2009

Pre-Practicum I

Supervisors: Mary Peterson, Ph.D., and Rikki Mock, M.A.

Given individual direction in psychotherapy skills training at the graduate level. These skills included intake interviews, active listening skills, providing feedback to clients and classmates, and videotaped simulated therapy.

RESEARCH EXPERIENCE

Research Assistant

2012- 2013

- Assist a Clinical Psychologist who runs a consulting business and leadership institute.
- Gather research, conceptualize, and create a research design for the purpose of improvement of succession planning across generations for family-run or owned business.
- Collaborate with a team to create a protocol for family-run or owned businesses to be efficient, effective, and sustainable across generations.
- Research various topics listed in a leadership manual to update references and modules.

Research Vertical Team

2010- Present

- Assist and consult with team members in design of various research projects.
- Conduct formal presentations of research projects and results.

- Complete data collection, entry, and analysis related to dissertation.

PUBLICATIONS/PRESENTATIONS

-
- Conlon, K., Gonzalez, L., KnowsHisGun, K., **Ulrich, J.** (2011, August). Exploring trauma exposure, generation of U.S residency, and perceived social support among Mexican-Americans and immigrants. Poster accepted for presentation at Division 45 Ethnic Minority Issues, APA Conference, Washington, D.C.
- Poolman, E., Schiefer, R., & **Ulrich, J.** (2012, September). Behavioral health integration in a rural setting: A case study model. Peer-reviewed lecture presented at Behavioral Health Forum hosted by Society of Teachers of Family Medicine, Chicago, IL.
- Ulrich, J.** & Adams, W. (2013, August). Evaluation of a Cognitive Training Program. Poster accepted for presentation under Division 40, The Clinical Neuropsychologist, APA Conference, Honolulu, HI.
- Ulrich, J.**, Adams, W., Simons, J., Schloemer, J., & Hansen, H. (2013, August). WISC-IV Digit span subtest: Developmentally uniform forwards vs. backwards contributions. Poster accepted for presentation under Division 40, The Clinical Neuropsychologist, APA Conference, Honolulu HI.

RELEVANT WORK/VOLUNTEER EXPERIENCE

- **OPC Student Representative**, Portland, Oregon
11/2013 – Present
Oregon Psychoanalytic Center Student Representative
Inform fellow student body of trainings, classes, consultation groups, and seminars hosted by OPC. Collaborate with OPC members and analysts to help decide which topics to offer as relevant trainings for graduate students in the state of Oregon.
- **OPA Student Subcommittee**, Portland, Oregon
09/2011- 08/2012
George Fox University Student Representative
Collaborated with a team of five students from the three Doctoral Psychology programs in Oregon to discuss relevant issues related to the field including professional and student-focused issues. Created Competency Awards for the OPA conference based on the competency guidelines submitted for student training by APA. Helped increase student involvement in OPA membership and the annual conference.
- **Peer Mentor, George Fox University**, Newberg, Oregon
06/2010- 05/2011
Peer Mentor to incoming PsyD student
Contacted the student prior to the start of the school year for questions, comments, and resources to improve the enrollment process. Provided advice for book buying, course enrollment, social connections, PGRE preparation, and other questions related to training.
- **Quiet Waters Outreach**, Tigard, Oregon
05/2009- 08/2010
Guest Services Specialist
Supervisor: MaryKate Pritchard
Direct care of 18 - 68 year-old adults with mental and developmental disorders. Responsibilities included milieu management, behavioral goal directed activities, respite care, and writing daily behavioral observations.
- **Friendsview Retirement Community**, Newberg, Oregon
05/2008- 09/2009
Caregiver
Supervisor: Ila Woolen
Direct care of 60–100+ year-old adults with mental and medical disorders. Responsibilities included milieu management, direct help with ADLs, resident activity leadership, and writing daily behavioral observations.
- **Friendsview Retirement Community**, Newberg, Oregon
02/2008- 05/2008
Social Companion
Supervisor: Marie Verburg
Facilitated activities for an 84 year-old female with Dementia and other degenerative diseases causing behavioral outbursts towards staff and other residents. Responsibilities included building companionship, engaging resident in mind and body, and running group activities when needed.

- **George Fox University Undergraduate**, Newberg, Oregon
08/2007- 12/2007
Peer Advisor
Supervisor: Kris Kays, Ph.D.
Mentored a group of college freshman students at George Fox University.
Provided guidance and assistance in order to help with the transition into college.

PROFESSIONAL AFFILIATIONS

2009 – Present	American Psychological Association (Student Affiliate)
2010 – Present	Multicultural Committee, George Fox University

RELEVANT TRAINING AND WORKSHOPS

“Integrated Behavioral Health: Primary Care Setting” Speakers: Brian Sandoval, PsyD & Juliette Cutts, PsyD Site: George Fox University, Newberg, OR	September, 2013
“The Person of the Therapist: How Spiritual Practice Weaves with Therapeutic Encounter” Speaker: Brooke Kuhnhausen, PhD Site: George Fox University, Newberg, OR	March, 2013
“African American History, Culture and Addictions & Mental Health Treatment” Speakers: Danette Haynes, LCSW & Marcus Sharpe, PsyD Site: George Fox University, Newberg, OR	January, 2013
“Sexual Identity” Speaker: Erika Tan, PsyD Site: George Fox University, Newberg, OR	November, 2012
“Suicide Risk Assessment” Speaker: Robert Tell, LCSW (Portland VA Medical Center) Site: Oregon Health and Sciences University, Portland, OR	November, 2012
“Treating Gender Variant Clients” Speaker: Erica Tan, PsyD Site: George Fox University, Newberg, OR	October 2012
“Mindfulness” Speaker: Erica Tan, PsyD Site: George Fox University, Newberg, OR	March, 2012
“Cross-cultural Psychological Assessment” Speaker: Ted Judd, PhD Site: George Fox University, Newberg, OR	November, 2011
“Motivational Interviewing” Speaker: Michael Fulop, PsyD Site: George Fox University, Newberg, OR	October, 2011
“Best practices in Multi-cultural assessment” Speaker: Eleanor Gil-Kashiwabara, PhD Site: George Fox University, Newberg, OR	October 2010
“Primary Care Behavioral Health: Where Body, Mind (& Spirit) Meet” Speaker: Neftali Serrano, PhD	October 2010

- Site: George Fox University, Newberg, OR
- “Current Guidelines For Working With Gay, Lesbian, and Bisexual Clients: March 2010
The new APA practice guidelines”
Speaker: Carol Carver, PhD.
- Site: George Fox University, Newberg, OR
- “Multicultural Counseling: ADDRESSING Model” January 2010
Speaker: Winston Seegobin, Psy.D.
Site: George Fox University, Newberg, Oregon