

Abstract

Implementing the Alert Program for Self-Regulation through the Response to Intervention Model with Selected At Risk Children: Collaborating with Elementary Education Teachers to Identify Effective Strategies for Improving Students' Readiness to Learn

by

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While all students will show changes in their level of alertness throughout the day, it is more difficult for students who have sensory processing or sensory integration difficulties to stay focused and alert during the school day. Not being able to alter his or her state of alertness to fit the classroom activities that are occurring could cause these students to be delayed in mastering school readiness skills, participation in school occupations, and understanding the educational material that is presented. The Alert Program for Self-Regulation is a compilation of activities and strategies that are based on Ayers's sensory integration and designed to help children recognize, maintain, and alter their alertness level to match either the environment they are in, or task they are completing.

The purpose of this exploratory research study was twofold. First, to prospectively determine whether short-term, targeted application of Alert Program strategies was effective in improving the performance in students specifically identified as being "probably" or "definitely"

at risk for self-regulation difficulties, and second, to retrospectively determine whether generalized, year long participation in the Alert Program as kindergarteners produced lasting effects for first and second graders. An extension of the first aim was to determine whether prior participation as kindergarten students in general programming influenced outcomes in specific programming one or two years later. **Methods:** There were 60 participants in all. Student populations included first and second grade students at The Oakwood School, an independent school in rural North Carolina, and a control group of second grade students at Williamston Primary School. All students were assessed using The Sensory Processing Measure (SPM-C) (Kuhaneck, Henry, & Glennon, 2007) and School Function Assessment: Part III Activity Performance – Cognitive/Behavioral Tasks (SFA) (Coster, Deeney, Haltiwanger, & Haley, 2008). Students at The Oakwood School who scored as having a probable or definite difference in one of four subtests, vision, hearing, touch, or balance and motion, or the total score for the SPM-C were included in a six or eight week follow-up of Alert Programming. The SPM-C and SFA were completed following intervention as a posttest for all Oakwood first and second grade students and the control group to be used as for analysis in part one of the current study. **Results:** A significant difference was found between the intervention group and non-intervention group in the SPM-C total score for one of the Oakwood second grade classes. To evaluate the durability of the Alert Program from kindergarten to second grade, trends of change were assessed for the “at-risk” control and intervention groups and the “not-at-risk” control and intervention groups. The trends were assessed at three time-points in order to assess the durability of kindergarten programming to the first and second grade year prior to any follow-up programming. The time points included kindergarten pretest, kindergarten posttest, and second grade pretest. The trends were found to be different for each group and for each measure. Overall, for most of the subtests,

all four groups showed a trend of increasing their functioning from pretest in kindergarten to posttest in kindergarten and a trend of returning to baseline scores at second grade pretest.

Discussion: The Alert Program was shown to be beneficial for students as measured by two separate metrics. The current study shows that for the Alert Program to be the most effective it is important for classroom teachers to fully embrace the need and implementation in the classroom. Also, without Alert Programming students tended to return to baseline skills, rather than maintain the skills they learned. Therefore, it would be advantageous for “at risk” students to have Alert Programming each year to build upon sensory processing and self-regulation skills acquired during the Alert Program.

Implementing the Alert Program for Self-Regulation through the Response to Intervention
Model with Selected At Risk Children: Collaborating with Elementary Education Teachers to
Identify Effective Strategies for Improving Students' Readiness to Learn

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CHAPTER 1: INTRODUCTION

Occupational therapy services have been offered in the school system for 37 years (Dunn, 1988). The passage of The Education for All Handicapped Children's Act in 1975 identified occupational therapy as a related service that should be provided for children in the school system. This ensured students were provided services that would support and enhance their educational goals (Dunn, 1988). More recently, the roles of occupational therapists in the school system have broadened due to the implementation of the Individuals with Disabilities Improvement Act (IDEA) of 1990 and The No Child Left Behind Act of 2001 (Reeder, Arnold, Jefferies, & McEwen, 2011; Cahill, 2007). These pieces of legislation further established occupational therapies role in providing intervention early (Reeder, Arnold, Jefferies, & McEwen, 2011). Also, the implementation of the Response to Intervention (RtI) Model has been a general education initiative, which permits occupational therapists to provide services at different levels in the school system, including direct service to the child, service to small groups, and consultative services to teachers for entire classrooms (Cahill, 2007).

The delivery models, focus, and methods of occupational therapy have evolved in the school system over the past 10 years. Occupational therapists are increasingly being required to assess and provide services for students with sensory processing and sensory integration difficulties (Miller-Kuhaneck, Henry, Glennon & Mu, 2007). Within the general population of school children, it is estimated that 5-10 percent of students in schools experience sensory integration difficulties (Roley, Bissell, & Clark, 2009), and parents' reports reveal an estimated 5-13 percent of all children have sensory processing disorders (Miller-Kuhaneck, Henry, Glennon & Mu, 2007). According to Spencer, Turkett, Vaughan, and Koernig (2006), who surveyed the roles and interventions used by occupational therapists in Colorado, found that

altering students' sensory problems was the main focus of pediatric occupational therapy services in that state.

It is a known fact that all individuals have fluctuations in their level of alertness throughout the day. Students may become lethargic, as seen by laying their heads on their desks, or hyperactive, such as talking to a neighbor or running around the classroom. These difficulties are intensified for students who have difficulty remaining on task or adapting to stimulation of their senses, such as sound, touch, movement, and visual stimulation (Skibbe, Phillips, Day, Brophy-Herb, & Conner, 2012). Frequently, these misbehaviors are mistaken by teachers as intentional disruptions or a deliberate refusal of the child to obey instructions, which many times results in the teacher's use of behavior management efforts to try to correct the child's behavior, unintentionally ignoring the underlying need for more or less sensory input. Not being able to alter his or her state of alertness to fit the activities that are occurring in the classroom could cause these students to be delayed in his or her school readiness skills, his or her participation in school occupations, and his or her ability to understand the educational material that is presented to them (Bagatell, Mirigliani, Patterson, Reyes, & Test, 2010).

The intervention approach that is commonly recommended and used with children with sensory processing deficits is to implement sensory processing strategies, such as hand fidget toys or sitting on therapy balls instead of stable chairs (Bagatell et. al, 2010). These strategies enable the children to maintain appropriate arousal states needed for learning and attending to school tasks at-hand by providing them with sensory input, enabling them to better attend and participate during class time. The Alert Program for Self-Regulation (AP) is a program that uses sensory-based activities to help children learn to maintain an optimal level of arousal using an analogy of a car engine to teach children different strategies to understand their arousal state and

learn to keep their engine, or arousal state, just right (Williams & Shellenberger, 1996). The AP is used with children with a variety of disabilities who have sensory processing deficits. Barnes, Vogel, Beck, Schoenfeld, & Owen (2008, p. 371) implemented the AP in a middle school with children with emotional disturbance and reported many professionals working in the middle school found it to be a cost-effective program and considered it a “model of best practice.”

Additional research and investigation concerning the effectiveness of the AP is important in that the current evidence-based research available is limited. There are less than 10 studies in peer-reviewed journals speaking to the use and implementation of this program in any area with any age group. Also, the studies that have been completed include a small number of participants and mostly focus on being implemented with children with disabilities. Although this program can also be applied with typically developing students with learning and attention difficulties (Shellenberger & Williams, 2002), there is a void in the available evidence focusing on the use of this program with children in a general education classroom. Students that do not have a confirmed diagnosis, such as developmental delay, and are experiencing self-regulation difficulties in a general education classroom are children being underserved and are at risk of falling behind with no extra help from school professionals. Although this program is beginning to be used for students with identified diagnoses and difficulties, this program is currently not being fully implemented to serve students in general education classrooms.

In conclusion, occupational therapy has been provided in the school system for an extended period of time and legislation has extended occupational therapy services to serve students at different levels of the system (Reeder, Arnold, Jefferies, & McEwen, 2011). The number of students with sensory processing or sensory integration deficits occupational therapists are serving has increased dramatically (Miller-Kuhaneck, Henry, Glennon & Mu,

2007; Roley, Bissell, & Clark, 2009; Spencer, Turkett, Vaughan, and Koernig, 2006). An inability for students to regulate their states of alertness can be a source leading them to being behind in understanding classroom materials and functioning in the school environment (Bagatell et. al, 2010). Implementing sensory strategies is a common intervention used with these students to maintain appropriate arousal states, and the AP is a program that utilizes these strategies and is shown to be a gold-standard, cost-effective model (Williams & Shellenberger, 1996; Barnes, Vogel, Beck, Schoenfeld, & Owen, 2008). Currently, there are few studies dedicated to examining the implementation and effectiveness of this program with any age group and there is no discussion of the program being utilized with children in general education classrooms.

Purpose of the Study

For the past two years, 2010-2011 and 2011-2012, the East Carolina University Occupational Therapy Department completed two research studies to determine the effectiveness of the AP with kindergarten children. During both research studies the AP was implemented for all students in two kindergarten classrooms at The Oakwood School, which is an independent school in eastern North Carolina. The forty minute program was offered once a week for five months. The Response to Intervention model (RtI) allowed the researchers to generalize the AP for all students both years offering a repertoire of sensorimotor activities and strategies for self-regulation. The 2010 and 2011 studies at Oakwood demonstrated and replicated the general application of the AP with kindergarten students and showed it could be effective in generating improvements in overall classroom functioning, as measured using the *School Functional Assessment – Part III- Activity Performance- Cognitive/Behavioral Tasks* (SFA) (Buchanan, R., 2011). In addition, changes in “sensory processing issues” as measured using the *Sensory*

Processing Measure-Main Classroom Form (Kuhanech, Hendry, & Glennon, 2007) (SPM-C) were also observed, but were less robust than those measured using the SFA. However, the durability of the changes, if any, is not known. Therefore, the overall goals of this study were to 1) determine the effectiveness of additional Alert Programming for specified at risk children in first and second grade, and 2) determine if the implementation of a generalized program of the Alert Program in the kindergarten year was durable and sustained into the first and second grade years.

The first part of the study assessed responses of identified at-risk first and second grade students with self-regulation difficulties, both those who were present during kindergarten Alert Programming and those who were not to specific individualized AP activities and strategies that would help their level of alertness to be successful in the classroom. Parental consent was obtained for all first and second grade students at the Oakwood School, and second grade students that participated in the control group from Williamston Primary School during the 2010-2011 study. In this part of the study, after parental permission was obtained and pretest data was completed, students participated in eight weeks of using individualized activities. The program activities were selected from the Alert Program® for Self-Regulation, and implemented using the RtI model (tiers one and two). The ability of first and second grade students identified as having self-regulation difficulties to regulate their arousal state for learning and basic functioning in the academic and social aspects of the classroom were evaluated using the SFA. The sensory impact of eight weeks of these individualized activities on students' sensory processing abilities that may underlie the changes observed using the SFA was evaluated using the SPM-C. Comparisons were also made between the intervention group at the Oakwood School and the control group following the eight week Alert Programming received by the intervention group.

It was anticipated that following eight weeks of using the Alert Program® for Self-Regulation in daily individualized activities, the first and second grade students who participated in the kindergarten AP research study would show improvement, as assessed both by the SFA, and SPM-C. The rationale for this anticipated outcome was 1) the students have an established general framework of experience with AP activities that will facilitate implementation and ease of use with the individualized program; 2) the activities were selected and individualized for each student specifically for their identified need(s); 3) the activities were carried out on a daily basis; and 4) the students were older, and better able to self-select and self-administer the identified activity program choices. Also, it was anticipated that the control group would maintain their abilities or decrease in their functioning from pretest to posttest due to the lack of Alert Programming.

The second goal of this study was to re-evaluate current first and second grade students who participated in the five month long kindergarten 2010-2011 and 2011-2012 AP research projects, and who still attend the Oakwood School. Also, the second grade students who participated in 2010-2011 study and still attended Williamston Primary were re-evaluated. To complete this portion of the study, parental permission was obtained and the primary first and second grade classroom teachers at the Oakwood School and the second grade teachers at Williamston Primary completed two assessments on their students: 1) the SPM-C; and, 2) SFA. These assessments are designed to be completed by the primary teacher and were used in both kindergarten AP research projects. This allowed the researcher to compare three sets of test results (kindergarten pretest, kindergarten post- test, and either first grade or second grade pretest) from three subsets of students. The first subset was students who attended kindergarten at Oakwood and participated in the 2010-2011 AP research project and are now in second grade.

The second subset was students who attended kindergarten at Oakwood and participated in the AP research project in 2011-2012 and are now in first grade. The third subset was students who attended kindergarten at Williamston Primary School and participated in the research study in 2010-2011 and are now in the second grade. Comparing the relative changes between the current first grade and the current second grade cohorts enabled assessment of a time dependent aspect of the durability of the Alert Programming effect. Data also were obtained from any new first or second grade students that did not previously participate in the 2010-2011 or 2011-2012 studies. These students did not have assessments for the kindergarten years, and therefore, could not be included in this longitudinal component of the study. However, these data allowed additional interpretations by assessing current overall functionality of a novice, age matched cohort, with the student cohorts that previously had participated in the 2010-2011 or 2011-2012 studies.

It was anticipated that the benefits observed after the program was completed in the kindergarten setting would have eroded or disappeared when re-evaluated in either the current first or second grade students. Further, it was anticipated that the control group's scores would have declined from the kindergarten posttest to the time of re-evaluation. The rationale for this anticipated outcome is that 1) the implementation of Alert programming in kindergarten was generalized for all students, rather than specific to each child's sensory needs, 2) there was significant intervening time without program re-enforcement by teachers and school staff, 3) the sensory processing impact, as measured by the SPM-CF was less robust than the SFA outcomes, and 4) significant sensory motor development occurs in this age group.

Chapter 2: Literature Review

Response to Intervention

The educational system in the United States is beginning to move away from the “wait-to-fail” approach for children that are having difficulties in school (Denton, 2012). There is currently a movement towards a Response to Intervention (RtI) approach, which is a three-tiered model. In this model, tier one is focused on providing optimal, evidence-based education for all children within a classroom and identifying any child at risk through standardized testing; tier two is focused on providing additional intervention to a few children in small groups that are at risk for having difficulty; and, tier three is focused on providing more intervention for specific children that are not responding to tier one or two (Denton, 2012). While occupational therapists have been working in school systems for some time and providing services for students that qualify for special education or have an identified disability, legislation of IDEA of 2004 and the No Child Left Behind Act of 2001 has solidified the presence of occupational therapists as a related service in the school system. The implementation of the RtI model has also expanded the role of occupational therapists to allow them to provide early intervening services at different levels of interaction with the students, from generalized interface with a whole classroom to one-on-one contact. This model allows occupational therapists to provide intervention at the tier 2 and tier 3 levels, and, at the tier 1 level, give teachers and parents information about intervention strategies to implement for the entire class and at home and serve on student support teams (Reeder, Arnold, Jeffries, McEwen, 2011).

Relationship between Self-Regulation and Academic Success

Self-regulation is the processes and approaches that allow children to sustain or change internal states and responses to external stimuli in order to pursue goals (Skibbe, Phillips, Day,

Brophy-Herb, & Conner, 2012). Self-regulation is the underpinning of many skills related to changing and directing behavior and enabling students to perform in settings that are cognitively challenging, such as the school setting (Connor, Ponitz, Phillips, Travis, Glasney, & Morrison, 2010). Therefore, students' self-regulation skills during their early education have long-term effects on their academic success in all subjects, especially literacy (Skibbe, et al., 2012).

Students with increased self-regulation abilities are better able to ignore distractions in the classroom setting, regulate their behavior, listen to and follow directions, interact appropriately with peers, and stay on task for longer periods of time (Conner, et. al, 2010; Skibbe, et al., 2012).

Liew, McTigue, Barrois, and Hughes (2008) completed a study focusing on the effects of self-regulation abilities in first graders on their self-efficacy and their academic performance through third grade. This longitudinal study followed 733 first graders, who scored below the median on a test of literacy that was administered by the district and approved by the state, through their third grade year. Each year the students were administered several measures. First, the students were asked to walk along a ribbon taped to the floor to measure and use a pencil to trace geometric figures on the lines in order to measure effortful and inhibitory control. Second, teachers completed the ego-resiliency subscale from the California Child Q-Set to measure ego-resiliency. Third, each student provided self-reports concerning their self-efficacy in the classroom. Lastly, the children completed the Broad Reading and Broad Math sections of the Woodcock Johnson-III Tests of Achievement to measure their academic achievement. Results revealed that increased self-regulation skills increases confidence in the students' academic performance and their competence in academic material. The researchers found that self-regulation and self-efficacy have a revolving relationship. Students that are better able to regulate their behavior and response to their environment have more successful interactions in the

classroom. These successful interactions elicit positive feedback from the teachers, peers, and parents, which increases their self-efficacy. Also, children that believe that they can be successful in the classroom have increased motivation to remain focused and alert during the school day by using their self-regulation abilities, and ultimately increasing their academic performance (Liew, McTigue, Barrois, & Hughes, 2008).

In all grades, especially in the elementary years, students begin the school year with differing levels of self-regulation skills. The students with decreased ability to regulate their behavior and response to stimuli require increased effort and instruction on the part of the teachers in order for them to be able to comprehend information and stay on task (Conner, et. al, 2010; Skibbe, et al., 2012). Therefore, evidence has shown that an individualized approach to instruction has positive impacts on students' self-regulation skills (Connor, et. al, 2010). Conner, et. al (2010) conducted a research study to examine the effects of individualized instruction on the self-regulation skills of students in first grade classrooms. The teachers in the intervention group were instructed in the use of Assessment-to-Instruction planning software, which analyzes assessment results for each student and provides recommendations of the type and amount of instruction each student needs to be successful. Results showed that students with weaker self-regulation skills who received individualized instruction showed greater gains in self-regulation from the beginning of the school year to the end of the school year than the control group. Also, students with weaker self-regulation can be more challenging to manage in an education setting and the focus on individualized instruction could have provided the teachers in the intervention group with strategies to effectively instruct these students (Connor, et. al, 2010).

As stated previously, students with decreased self-regulation are more difficult to instruct in the classroom setting, have decreased ability to participate constructively in educational

opportunities, spend more time in off-task behavior, and create distractions and disruptions during instruction (Conner et. al, 2010; Skibbe, et al., 2012). Also, off-task behavior may follow a form of social contagion, in which if one student becomes off task it encourages others to follow this trend (Skibbe, et al., 2012). Classroom instruction is vital for education in the elementary years, particularly for early reading skills. In classrooms that are composed of several students with decreased self-regulation, instruction time may be decreased or interrupted often due to disruptions cause by these students. Consequently, not only does a student's own self-regulation impact their academic performance, but the self-regulation of peers impacts academic performance (Skibbe, et al., 2012).

Skibbe, et al. (2012) completed a research study focused on analyzing the effects of classmates' self-regulation on early literacy growth in first graders. Researchers completed two subtests from the Woodcock-Johnson Achievement Tests III, including passage comprehension and picture vocabulary, on each student to assess their literacy development. The head-toes-knees-shoulders (HTKS) task was completed by each student to assess their self-regulation skills. This task consists of the students first following instructions given by the tester, such as touch your head, and then completing the opposite of what the tester instructs, such as touching the toes when instructed to touch the head. Students are given a score of 0 for incorrect response, 1 for self-correcting, and 2 for a correct response. To assess the overall self-regulation abilities of each classroom, the HTKS scores for each student in the classroom were averaged. Results revealed that increased vocabulary skills were linked to the students' own self-regulation. Students' self-regulation predicted vocabulary gains, but not consistently in all students. However, vocabulary skills were significantly predicted by class self-regulation. Students in

classrooms with lower self-regulation had smaller vocabulary gains than students in classrooms with higher self-regulation (Skibbe, et al., 2012).

Ayers's Sensory Integration and Processing Strategies

Sensory processing focuses on registering and modulating sensory information from the environment and organizing this sensory input internally. When sensory processing is completed successfully, one is able to adapt his or her responses to sensory stimuli in the environment, which allows individuals to better engage in meaningful daily occupations (Gal, Dyck, & Passmore, 2010). Sensory processing strategies can be used for individuals with or without an identified disability. Sensory integration theory, which was developed by A. Jean Ayers in the 1970's, focuses on the ability of the brain and central nervous system to organize sensory information that the body is experiencing (Young, 2007). This provides the body with an important foundation so they can better focus on more complex behavior (Young, 2007). This theory hypothesizes that sensory integration strategies help individuals with sensory processing disorders to process sensory information and regulate that information so they are better able to focus and adapt to the environment. Sensory integration treatment usually includes interventions such as weighted blankets, massage and pressure vests (Reichow, Barton, Good, Warley, 2009). Sensory integration strategies are best utilized with individuals with disabilities, particularly sensory processing or sensory integration disorders.

Implementing sensory integration and sensory processing theories into interventions, through sensory processing strategies, is particularly important for children in the school system because sensory processing is thought to be vital for maintaining an optimal state for performing occupations, which, for a school-age child, includes the ability to learn and adjust their behavior (Bagatell, et al., 2010). Many times, sensory-based difficulties, such as sensory processing

disorders prevent children from organizing their sensory experiences, resulting in being under- or over-stimulated. These difficulties can be misunderstood as behavior issues or misconduct on the part of the individual, and many times can inhibit the child's ability to learn new and complex information, particularly in the life of a child in the school system (Young, 2007).

Emotional disturbance co-occurs, many times, with sensory processing and learning disorders. Children with emotional disturbance represent one of the top disability groups in the public school system (Barnes, et al., 2008). Therefore, many children suffering from emotional disturbance disabilities in the public school system can benefit from the use of sensory integration strategies as an intervention to maintain optimal arousal throughout the school day.

Not only do children with identified disabilities have difficulty maintaining the best state for focusing, but typically developing children can become overactive or lethargic many times throughout the day. Examples include difficulty sitting still in his or her seat, participating appropriately in activities initiated by the teacher, or stimulation seeking behaviors, such as jumping or pushing a neighboring student. The use of sensory processing strategies to keep his or her engagement at the best level, would provide an advantage for these children while learning and engaging in school activities. Occupational therapists may consider using sensory processing approaches as an intervention for these behaviors, such as weighted vests and objects to grasp and manipulate in class, also known as fidgets.

An example of a sensory processing intervention is the use of therapy ball chairs in classrooms. Schilling and Schwartz (2004) conducted a study to better understand the effects of therapy ball chairs in a classroom on the engagement in activities and the in-seat behavior of four children with Autism Spectrum Disorder (ASD). Using an A-B-A-B design, the children were studied at baseline, with the therapy balls, withdrawal of the therapy balls, and re-

implementation of the therapy balls over a three week period. Results showed all four of the children's in-seat behavior and engagement in activities improved during the use of therapy balls and, during the withdrawal stage, the children's in-seat behavior and ability to maintain engagement in the activities immediately returned to baseline. When the children were allowed to have therapy balls, which allow them to independently bounce slightly to change their arousal state, results suggested they were better able to focus on learning (Schilling & Schwartz, 2004). Although this study shows that this sensory processing strategy is helpful, more research is required because this study included a very small sample size and only focused on children with ASD.

In contrast, a replication study was completed by Bagatell, et al. (2010) in a public school classroom special education classroom of six boys with Autism Spectrum Disorder. The researchers used an A-B-C design. First, the children carried out Circle Time as usual in the classroom, sitting on chairs. Then, all children and staff sat on a therapy ball in a ring stabilizer for two weeks. Finally, the children were able to daily choose to sit in a chair or in on a therapy ball for five days. Researchers used a time sampling to record data of whether each child was engaged and in his or her seat. Mixed results were found, and overall, it was determined that therapy ball chairs did not contribute substantially to the children's engagement and in-seat behavior. Further, the teachers reported that they did not value the therapy ball chairs in the classroom because the children would bounce in their chairs (Bagatell, et al., 2010).

In comparison, an example of a sensory integration intervention that is used often in the school setting with children with an identified diagnosis is the use of weighted vests, which is a vest that has up to ten percent of the child's body weight distributed in the vest. Olson and Moulton (2004) completed a study examining the patterns of use and perceived effectiveness of

weighted vests. In a telephone survey study that was completed with 51 pediatric occupational therapists, Olson and Moulton found 64.7% of the participants had used weighted vests on at least nine children. When referencing when the children were wearing weighted vests, the most commonly reported observed behavior stated by the participants were staying on task, ability to keep their attention focused, and less wandering. Further, participants who reported using weighted vests with children with sensory integration disorder indicated frequently these children would often hit or have temper tantrums before wearing the vest and these behaviors decreased or disappeared when the vest was worn (Olson & Moulton, 2004). This study provides favorable results for weighted vests, however, it is not generalizable because it is a convenience sample and did not represent all pediatric occupational therapists. Also, another study was completed examining the usefulness of weighted vests that had conflicting results (Reichow, Barton, Good, & Warley, 2009).

The Alert Program for Self-Regulation

The AP is a compilation of activities, lessons, and strategies that incorporate sensory integration techniques (Williams & Shellenberger, 1996). The program helps children understand the principles of sensory integration and self-regulation by comparing their bodies to a car engine, stating that the child's engine can run high, low, or just right (Williams & Shellenberger, 1996). This analogy helps children understand that they need the right amount of and the right kind of sensory stimulation to help them to function at their optimal state (Williams & Shellenberger, 2002). The main focus of the program is to help children recognize, maintain, and alter their alertness level to match the environment they are in or task they are completing (Williams & Shellenberger, 1996). A secondary focus of the program is to provide the students with a repertoire of sensory strategies that can change their level of alertness (Williams &

Shellenberger, 1996). These sensory strategies are focused on five main senses, including tactile, visual, auditory, vestibular, and oral (Williams & Shellenberger, 2002). This program was initially designed for children ages eight through twelve; however it has “application to all ages and ability” and has been adapted to be available for preschool children through adulthood (Williams & Shellenberger, 2001, p. 2). It can be implemented for specific individuals or for an entire group and can be implemented by teachers, parents, or therapists with the supervision of an occupational therapist that understands the theory of Ayres’s sensory integration and interventions associated with arousal states (Williams & Shellenberger, 1996).

The AP is being implemented in schools throughout the nation. Barnes, Beck, Vogel, Grice, and Murphy (2003) completed a national survey of school-based occupational therapist and found that 28.6% of the occupational therapists surveyed work with children with emotional disturbance in group interventions. The survey revealed the most common group intervention used by these therapists with this population of students was the AP (Barnes, et. al., 2003). The AP is also being used internationally. Young (2007) discusses her role as an occupational therapist working with the “Scottish Borders” ADHA Service, which is a community-based service in Scotland that provides therapies for children in rural primary and high schools. She explains that sensory integration is a difficulty for many of the children with ADHD for which she provided services. The AP is used in the “Scottish Borders” ADHD Service, and is very helpful for these children to change and maintain their optimal arousal state in order to complete tasks in their homes and school (Young, 2007).

Although the AP is being used in the school systems in the United States and abroad, there is little research dedicated specifically to the effectiveness of the AP in any setting or with any age group of children. A study was conducted by Barnes et al. (2008) to assess the

usefulness of the AP in a classroom setting for children with emotional disturbances. The researchers implemented the AP in four public school classrooms for children with emotional disturbance, with a total of twelve participants (Barnes et al., 2008). The Sensory Profile and Devereux Behavior Rating Scale were used for pretest and posttest (Barnes et al., 2008). The results concluded that the Sensory Profile scores of the intervention group showed little change (Barnes et al., 2008). However, the Sensory Profile scores of the control group decreased from typical performance to probable difference (Barnes et al., 2008). Also, the Devereux Behavior Rating Scale scores for the intervention group increased for six of the participants, while all of the scores for the control group decreased (Barnes et al., 2008). This shows skills and abilities of the students that were involved with the AP remained the same over time, while the abilities of the students in the control group deteriorated.

Further, a study was completed with seven students, six having conditions on the autism spectrum and one with attention deficit hyperactivity disorder (ADHD), participating in the AP for six weeks (Zeidler, 2012). Post-intervention, it was found the students were better able to focus in the classroom and on educational tasks, per teacher report, and they were better able to articulate strategies that could be used to self-regulate (Zeidler, 2012). This is a promising study, but more research is required because a small population was used in this study, it was only implemented with students with Autism Spectrum Disorder and ADHD, and the author recommended changing the implementation time from six to at least eight weeks in order to increase the students' and teachers' implementation and use of sensory processing strategies.

Reviewing the literature reveals gaps in the research that is available and emphasizes the fact that there is a significant lack of research existing on the topic of the AP and its effectiveness in classrooms. Previous studies have focused on the use of sensory integration and sensory

processing strategies, but most of the research has been dedicated to the use of sensory ball chairs and weighted vests, and ignored other strategies, such as the use of fidgets. Further, the research that has been completed on these strategies has found conflicting results. Aside from the few studies dedicated to the AP, which had small sample sizes and focused on very specific populations, there is no research dedicated to the use and effectiveness of the AP in different settings. More research is needed to study the effectiveness of the AP for children with disabilities and typically developing children that experience self-regulation difficulties. Lastly, there is no research highlighting the children's and teacher's perspective of the AP and their value of it being used as an intervention.

Therefore, the purpose of this study was two-fold. First, to determine the effectiveness of additional Alert Programming that is specified to each child's needs for specified at risk children in first and second grade in the same independent school in rural North Carolina. An extension of this purpose was to determine whether there was a difference in the response to a more targeted, short-term intervention program based as a function of whether or not students had previously received generalized classroom program in kindergarten. Second, to determine if the implementation of a generalized program of the AP in the kindergarten year was durable and sustained into the first and second grade years.

CHAPTER 3: METHODOLOGY

All of the ECU studies described, including the 2010-2011 study, 2011-2012 study, and the current study, were reviewed and approved by the Institutional Committee for the Protection of Human Subjects (“IRB”). The study was classified as exempt (Appendix L). An amendment was added to the current IRB for the Kindergarten Alert Program Research, which was completed and approved (See Appendix L for IRB amendment). The parents of all students in the first and second grade classrooms at the Oakwood School, and of all students from the 2010-2011 control group that were still attending Williamston Primary School were asked to complete a parental consent form granting permission for the students to participate in the study (See Appendix H for Oakwood parent consent and I for Williamston parental consent forms). The consent forms (See Appendix H for Oakwood parent consent and I for Williamston parental consent forms) were provided to parents whose child is in the first and second grade classrooms at the Oakwood School and the parents whose child was in the control group in the 2010-2011 Alert Program study at Williamston Primary School. Following completion of the form, parents returned the forms to the primary classroom (pc) teachers and then returned to the researchers. All but one parent of students in first and second grade classrooms at the Oakwood School granted permission for their child to participate in the study and returned the consent forms to the primary classroom teacher. Eight of the remaining control group students, now in second grade classrooms, from the Williamston Primary School returned consent forms to the pc teachers granting permission for the students to participate in the study.

Design

This follow-up exploratory research study continued to use a quantitative pretest/posttest design that is well suited for the educational setting. The first and second grade student groups

were made up of children that attended the Oakwood School and were identified with self-regulation difficulties based on pretest scores from the SPM-C completed in January, 2013. There were two sub-groups, group 1 was made up of identified first grade students from two current first grade classes at the Oakwood School, and group 2 was made up of identified second grade students from two current second grades classes at the Oakwood School.

All students in the first and second grade classrooms at the Oakwood School, both those that were present in kindergarten and received Alert Programming and those that were not, were assessed by their current classroom teacher using the SPM-C and the SFA. In the SPM-C, a probable difference correlates to a T-score ranging from 60 to 69, and a definite difference correlates to a T-score ranging from 70 to 80. The students that scored having a probable or definite difference on the SPM-C, in any one of the four sub-tests chosen by the researchers or on SPM-C Total Score, were the students identified as at-risk for self-regulation difficulties and participated in the Follow-Up Alert Program Research Study. The four sub-tests (hearing, vision, touch, balance and motion) or the total score were selected for qualification because the AP specifically addresses a child's ability to regulate sensory information in these areas. The second grade students, in the study population, received eight weeks of sensorimotor activities and strategies for self-regulation that were based on Williams and Shellenberger's (1996) "How Does Your Engine Run" Alert Program and Williams and Shellenberger's (2001) "Take Five: Staying Alert at Home and School." The first grade students in the study population received six weeks of the same sensorimotor activities and strategies for self-regulation.

Prior to beginning the individualize Alert Programming, the researcher developed an acceptable recording system for the students to complete daily, and developed appropriate sensorimotor activities based on the students' areas of need (See Appendices J and K for a list of

all sensorimotor activities completed, and Appendix M for an example of a weekly recording sheet).

The student groups first received one small group review session lasting approximately twenty minutes on the AP, and then began daily, individualized AP sensorimotor activities and strategies that were self-selected by the student and facilitated by the researchers involved in the AP team and the East Carolina Occupational Therapy faculty advisor overseeing the current research project. The second grade student group received approximately five minutes of AP activities every morning for eight weeks. The first grade student group received six weeks of morning activities lasting the same amount of time. The rationale for a shorter program in first grade was because they were not as far removed from the original kindergarten programming as the second grade students. The researcher and the advising faculty member met with the Oakwood School pc teachers for the first and second grade to provide education on the AP. At this meeting, basic classroom context/routines were discussed in order to begin AP planning for the identified “at-risk” students. After reviewing the SPM-C pretest scores on the “at-risk students,” the researcher developed sensorimotor activities and strategies for self-regulation to be completed daily by the identified students and sensory strategies for the entire classroom to be implemented by the teachers.

It was the original intention of the researcher and advising faculty member for the students to complete two sensorimotor activities twice daily in the classroom when the students felt they needed increased sensory input to change their engine level. However, the pc teachers stated that the classroom routines would only allow students to complete sensorimotor activities once per day in the morning, and would be best completed in the hallway outside the classroom to decrease distraction to other students. Therefore, to respect the classroom routines and

learning of others and to increase research fidelity, it was determined that the students would participate in two self-selected sensorimotor activities in the morning. These activities were facilitated by one of the three East Carolina Occupational Therapy students or the faculty advisor. All facilitators were knowledgeable in principles of the AP, and implementation of sensory based activities and self-regulation strategies. The teachers for the first and second grade were encouraged to implement AP for all classroom students during classroom transition times throughout the day.

During the programming, the students came to the hallway daily, two at a time, and met with one of the three East Carolina Occupational Therapy Alert Team members or the advising faculty member. The first and second grade students chose two of the five sensorimotor activities to complete (e.g. put something in your mouth, move, touch, look and listen). The specific sensorimotor activities focused on the areas in which the identified students were having difficulties, including touch, vision, hearing, and balance and motion. Researchers utilized several activities that included heavy work because heavy work activities can change a child's level of self-regulation in either direction as needed by the student to become "just right" (Williams & Shellenberger, 2001) (See Appendix J and K for sensorimotor activities offered for the first and second grade students). At the end of each morning session, all participating students were asked to record their activities selections in a weekly activity chart by circling which activities were completed during that session (See Appendices C, D, E, and F for a list of weekly activities, and Appendix M for an example of a weekly activity chart). Every two weeks the researchers reviewed the AP activities and maintained some activities, but also added new choices. The biweekly updates provided variety and focused on the problem areas of the students. The recording sheets were updated every two weeks to reflect the changes in the

sensorimotor activities (see Appendices C, D, E, and F for a list of the sensorimotor activities for each week, and Appendix M for an example of a weekly recording sheet).

The available AP activities for the first grade students remained the same during the six week intervention period. Following each session the facilitator would record in the weekly recording chart by circling which activities were completed during the session (See Appendix J for list of sensorimotor activities for the first grade students).

Following the six or eight week AP, the teachers for the first and second grade classrooms at the Oakwood School completed the SPM-C and the SFA on all students, including those identified as at-risk and those that were not, as a posttest. Also, the pc teachers of the students in second grade classrooms in the Williamston Primary School with parental consent completed the SPM-C and the SFA for these students as a posttest.

Also, the SPM-C and the SFA were completed on eight second grade students from Williamston Primary School, a public school in rural North Carolina, that participated in the kindergarten control group in the 2010-2011 AP research study. These students were included in the current study as a control group for the second sub-group, which includes the identified at-risk second grade students.

At the completion of the study, the data collected from the posttest on all students were scored, analyzed and shared with the Oakwood primary level school coordinator. The researcher and advising faculty member asked for informal feedback concerning the individualized Alert Programming, the timing of the programming, how the programming affected the classroom routines, and the teachers' belief of the effectiveness of the program.

Participants

The school and students that participated in the current study were selected using a convenience sampling. The school, teachers, and parents of the students were willing to and volunteered to participate in the study. There were 66 students that fell into one of three groups that were eligible to be included in the study, including the control group of second grade students from Williamston Primary School, students that participated in the Follow-Up Alert Program Research Study from the first and second grade classrooms at the Oakwood School, and students that did not participate in the study from the first and second grade classrooms at the Oakwood School.

There were 17 students in the control group during the 2010-2011 kindergarten school year. Since the kindergarten year, four students moved away and four did not return the permission form for this study, leaving nine students eligible to be included in the control group during the current study. One of these nine students was excluded from the current study due to an inability to obtain posttest SPM-C data.

For the entire study, both the control and intervention groups, six students were excluded from the study due to moving away or an inability to obtain SPM-C pretest or posttest data on the students. The exclusions included one student from the control group and five students from the experimental group. Of the five, three students were eligible for the Follow-Up Alert Program Research Study, and two students were not eligible. Therefore, there were a total of 60 students included in this study, with eight students in the control group, 21 students that participated in the Follow-Up Alert Program Research Study, and 31 students that did not participate in the study. There were a total of 31 female subjects, including six female students in the control group, four female students that participated in the Follow-Up Alert Program

Research Study, and 21 females that did not participate in the study. There were a total of 29 male subjects, including two males in the control group, 17 males that participated in the Follow-Up Alert Program Research Study, and 10 males that did not participate in the study (See Table 3.1).

Table 3.1 The number of male and female students included in the control group, Oakwood group that participated in the Follow-Up Alert Program, and the Oakwood group that did not participate in the Follow-Up Alert Program.

	Participation in Follow-Up Alert Program Study	Male	Female	Total
Control Group	No	2	6	8
Oakwood Group	No	10	21	31
Oakwood Group	Yes	17	4	21
Total		29	31	60

Once parental consent had been obtained, all students in the first and second grade classrooms at the Oakwood School were assessed by their current primary classroom teacher using the SPM-C for eligibility to participate in the Follow-Up Alert Program Research Study. The students that scored in the probable difference range (T-score from 60 to 69), or in the definite difference range (T-score from 70 to 80), on any one of four sub-tests (vision, hearing, touch, or balance and motion), or on the total score were identified as at-risk for self-regulation difficulties and were eligible to participate in the study. Pretest and posttest data on the SPM-C and the SFA were collected on all first and second grade Oakwood students, including those that did not meet eligibility requirements to participate in the Follow-Up Alert Program. These data were used in the study as a comparison group of the same age and classroom in which to compare to the experimental group.

In the second grade classrooms at the Oakwood School, there were 14 students, 11 males and three females, that were identified as at-risk for self-regulation difficulties and who participated in the Follow-Up Alert Program Research Study. There were 16 students, five males and 11 females, who were identified as typical on the SPM-C, and therefore, did not participate in the Follow-Up Alert Program Research Study. In the first grade classrooms at the Oakwood School, there were seven students, six males and one female, who were identified as at-risk for self-regulation difficulties, and therefore, participated in the Follow-Up Alert Program Research Study. There were 15 students, five males and 10 females, who were not identified as having self-regulation difficulties, and therefore, did not participate in the Follow-Up Alert Program Research Study (See Table 3.2).

Table 3.2 Number of male and female students in the first and second grade at the Oakwood School that were identified as “at-risk” and “not-at-risk.”

	First Grade		Second Grade		
Gender	Not-At Risk	At-Risk	Not-At-Risk	At-Risk	Total
Male	5 22.7%	6 27.2%	5 16.7%	11 36.7%	27
Female	10 45.5%	1 4.5%	11 36.7%	3 10%	25
Total	15	7	16	14	52

Included in the study were students that were not attending the Oakwood School in the kindergarten year, and therefore, did not have pretest and posttest data from the kindergarten Alert Programming. However, these students were not excluded, and served as an “unplanned internal control” for the second part of this study to analyze if providing Alert Programming in the first and second grade year was beneficial for students. There were 10 students in the second grade classrooms at the Oakwood School that were not present in their kindergarten year, five of the 10 students participated in the Follow-Up Alert Program Research Study and the remaining

five did not, based on their Sensory SPM-C pretest scores. There were four students in the first grade classrooms at the Oakwood School that were not present in the kindergarten year, none of whom qualified to be included in the Follow-Up Alert Program Research Study.

Signed permission forms were collected from all 60 students at the Oakwood School and Williamston Primary prior to the beginning of the study. The inclusion criteria for this study were that participants must have been between the ages of five and eight years old, and must have a signed consent form from a parent to participate in the study. To be in the intervention group the student must have been identified as having a probable difference or definite difference in at least one of four sub-tests (vision, hearing, touch, or balance and motion), or on the total score on the SPM-C pretest completed January, 2013. Also, to be included in the study at the Oakwood School, students must have been enrolled in one of the first or second grade classes for the 2012-2013 school year. To be included in the study at Williamston Primary School, students must have participated in the kindergarten study during the 2010-2011 year and have been enrolled as a second grade student for the 2012-2013 school year. If a student missed two or more weeks of school during the eight week study, they were excluded from the analysis.

Instrumentation

Two assessments were used for pretest and posttest assessments in the previous ECU studies and in this exploratory research study: 1) the Sensory Processing Measure – Main Classroom Form (SPM-C) (Kuhanech, Hendry, & Glenon, 2007) (see Appendix A) and 2) the School Function Assessment: Part III Activity Performance – Cognitive/Behavioral Tasks (SFA) (Coster, Deeney, Haltiwanger, & Haley, 2008) (see Appendix B). Both pretest and posttest were utilized for analysis in part one of the current study, while only pretest of the current study was used for part two.

Sensory Processing Measure (SPM)

The Sensory Processing Measure (SPM) (Kuhaneck, Henry, & Glennon, 2007) is made up of three forms, including the Home Form, the Main Classroom Form, and the School Environments Form, which, together, assess the sensory processing, praxis, and social participation of children in kindergarten through sixth grade (Kuhaneck, Henry, & Glennon, 2007). The dimensions of this assessment are three-fold. First, it provides an assessment of the functioning of sensory systems, including auditory, visual, proprioceptive, tactile, and vestibular systems (Kuhaneck, Henry, & Glennon, 2007). Second, the assessment provides insight into the sensory vulnerabilities of each child, including sensory-seeking behavior, under-responsiveness or over-responsiveness, and perceptual concerns (Kuhaneck, Henry, & Glennon, 2007). Lastly, the assessment is completed across environments providing a comparison of the child's functioning in different contexts (Kuhaneck, Henry, & Glennon, 2007). For this research project, only the Sensory Processing Measure- Main Classroom Form was completed by the child's primary classroom teacher. The Sensory Processing Measure- Home Form and School Environment forms were not included in this study.

The Main Classroom Form consists of 62 items and each item is rated on a four-point Likert scale in relation to the frequency of a behavior, with options including *Never*, *Occasionally*, *Frequently*, and *Always* (Kuhaneck, Henry, & Glennon, 2007). The form produces eight standard scores that are norm-referenced. These scores include Social Participation, Vision, Hearing, Touch, Body Awareness, Balance and Motion, Planning and Ideas, and Total Sensory Systems (Kuhaneck, Henry, & Glennon, 2007). These standard scores allow the child's functioning to be rated into three ranges for each scale. These ranges include *Typical*, which correlates to a T-score ranging from 40 to 59, *Some Problems*, which correlates to a T-score

ranging from 60 to 69, or *Definite Dysfunction*, which correlates to a T-score ranging from 70 to 80 (Kuhaneck, Henry, & Glennon, 2007).

The Main Classroom Form has been shown to be both a valid and reliable test with estimates ranging from .95 to .98 for test-retest reliability and estimates ranging from .75 to .95 for internal consistency (Kuhaneck, Henry, & Glennon, 2007; Kuhaneck & Henry, 2009). To standardize the Main Classroom Form, a demographically representative sample was used of 1,051 children who are typically developing and in kindergarten through sixth grade (Kuhaneck, Henry, & Glennon, 2007).

School Function Assessment (SFA)

The purpose of the School Function Assessment is to measure the ability of students to complete functional tasks that support the students' ability to participate in social and educational activities in the school environment (Coster, et. al, 1998). The SFA is organized as a questionnaire that is completed by an individual who knows the student and their abilities to perform in the classroom well (Coster, et. al, 1998). The questionnaire is typically completed by the primary classroom teacher and assesses the students' performance in three areas: 1) participation; 2) task supports; and 3) activity performance (Coster, et. al, 1998). The focus of this study was primarily on the students' cognitive/behavioral abilities. Therefore, only the cognitive/behavioral portion of the assessment, which is located in the activity performance section, was used and was completed by the primary classroom teacher. The categories examined by the cognitive/behavioral portion of the SFA include functional communication, memory and understanding, following social conventions, compliance with adult directives and school rules, task behavior/completion, positive interaction, behavior regulation, safety, and personal care awareness (Coster, et. al, 1998). Each item in each category is rated on a 4-point scale (1=does

not perform, 2= partial performance, 3= inconsistent, and 4= consistent performance) (Coster, et. al, 1998).

The internal consistency for this assessment was determined through coefficient alpha procedures resulting in a score of 0.92 to 0.98 (Coster, et. al, 1998; Davies, Soon, Young, Clausen-Yamaki, 2004). Test-retest consistency was also measured and found to be a coefficient 0.82 to 0.98, showing the score of the test and what is measured is consistent each time the test is given (Coster, et. al, 1998; Davies, Soon, Young, Clausen-Yamaki, 2004). Further, validity studies found that the assessment was relevant to different levels of function and it is comprehensive (Coster, et. al, 1998; Davies, Soon, Young, Clausen-Yamaki, 2004).

Analysis

In the following chapter several tests were used to analyze the data for the current study. First, a repeated measures analysis of variance (ANOVA) was used. A repeated measures ANOVA is applied when comparing three or more group means in which there is a correlation between the subjects and measurements are taken more than twice. The independent variable is represented by the groups and the dependent variable is the score for each group on an outcome (Tomita, 2006). Second, a Tukey-Kramer Honestly Significant Difference (HSD) test was completed. This test is completed following an ANOVA in order to find a significance value (Tomita, 2006). The last type of statistical test used was a Fisher's Exact Test, which is a test of statistical significance that is most commonly used to analyze tables. The Fisher's Exact Test is most commonly used in data with small sample sizes. This test is able to show a significant difference between groups or in the table, but it is unable to specifically point out between which groups the significant difference is found. For this study the level of significance for all statistical analysis was indicated by a p-value at the 0.05 level (McDonald, 2009).

CHAPTER 4: RESULTS

The focus of the current study was two-fold. Part one focused on assessing the changes made for first and second grade students, both those that were present for kindergarten Alert Programming and those that were not, following a six or eight week implementation of the AP. Part two analyzed the durability of changes made during implementation of the AP in the kindergarten year to the first and second grade years.

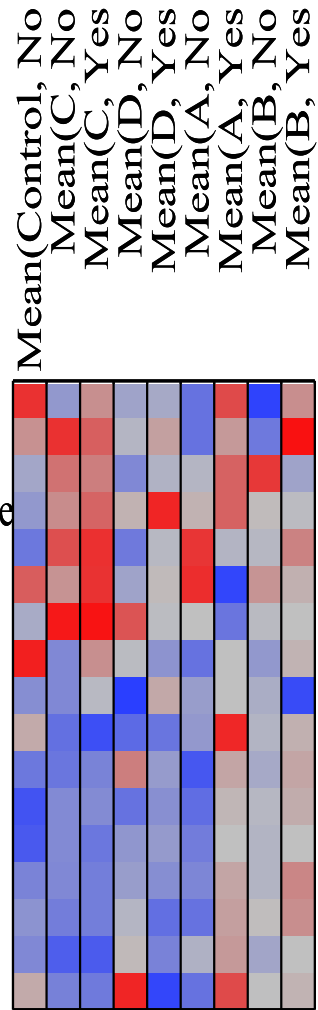
Part I: Follow-Up Alert Programming

The primary goal of this component of the study was to determine the effect of a six or eight week implementation of sensorimotor activities and strategies for self-regulation on the self-regulation of first and second grade students that had received previous Alert Programming in their kindergarten year and those that did not. Sensory Processing Measure-Main Classroom Form (SPM-C) and School Function Assessment (SFA) scores were compiled for all students, including first and second grade students at the Oakwood School and the students in the control group at Williamston Primary.

A cell plot of all data was created in order to assess the overall changes and observe variability (See Figure 4.1). In this display, the largest decrease in scores are indicated in dark blue and the largest increase in scores are in dark red. From this cell plot, researchers observed little change had occurred from pretest to posttest in the first grade students. Therefore, it was determined that analysis would focus on the changes made in the second grade classes, including the Oakwood second grade classes and the control group.

Analysis Columns

SFA: Functional Communication Score Difference
 SFA: Memory and Understanding Score Difference
 SFA: Following Social Conventions Score Difference
 SFA: Compliance with Adult Directives Score Difference
 SFA: Task Behavior/Completion Score Difference
 SFA: Positive Interaction Score Difference
 SFA: Behavior Regulation Score Difference
 SFA: Personal Care Awareness Score Difference
 SFA: Safety Score Difference
 SPM: Social Participation Score Difference
 SPM: Vision Score Difference
 SPM: Hearing Score Difference
 SPM: Touch Score Difference
 SPM: Body Awareness Score Difference
 SPM: Balance Score Difference
 SPM: Planning and Ideas Score Difference
 SPM: Total Score Difference



- Largest increase in score
- Largest decrease in score
- No change in score

Figure 4.1. Cell plot for first and second grade intervention classes and control group, which displays the largest decrease in scores as dark blue and the largest increase in scores as dark red. For the SFA, a higher score indicates better functioning. For the SPM-C, a lower score indicates better functioning. The figures shown for the first grade classes, classes A and B, are mostly gray. This shows that little change occurred in these classes from pretest to posttest. Further, including this data into the overall cell plot changes the variation and changes shown in the second grade classes, classes C and D, and control group.

A second cell plot was created displaying only the second grade classes and the control group (See Figure 4.2). This cell plot highlights that the largest difference in means was between the students who received the Follow-up Alert Programming, or the intervention group, and those who did not in Class D on the SPM-C total score. A one-way ANOVA was completed showing a significant difference at the 0.05 level between the classes. A Tukey-Kramer HSD comparison revealed a significant difference at the 0.05 level between the intervention group and those that did not receive the intervention in Class D on the SPM-C total score and borderline significant difference at the 0.05 level between the intervention group in Class D and the control group on the SPM-C total score.

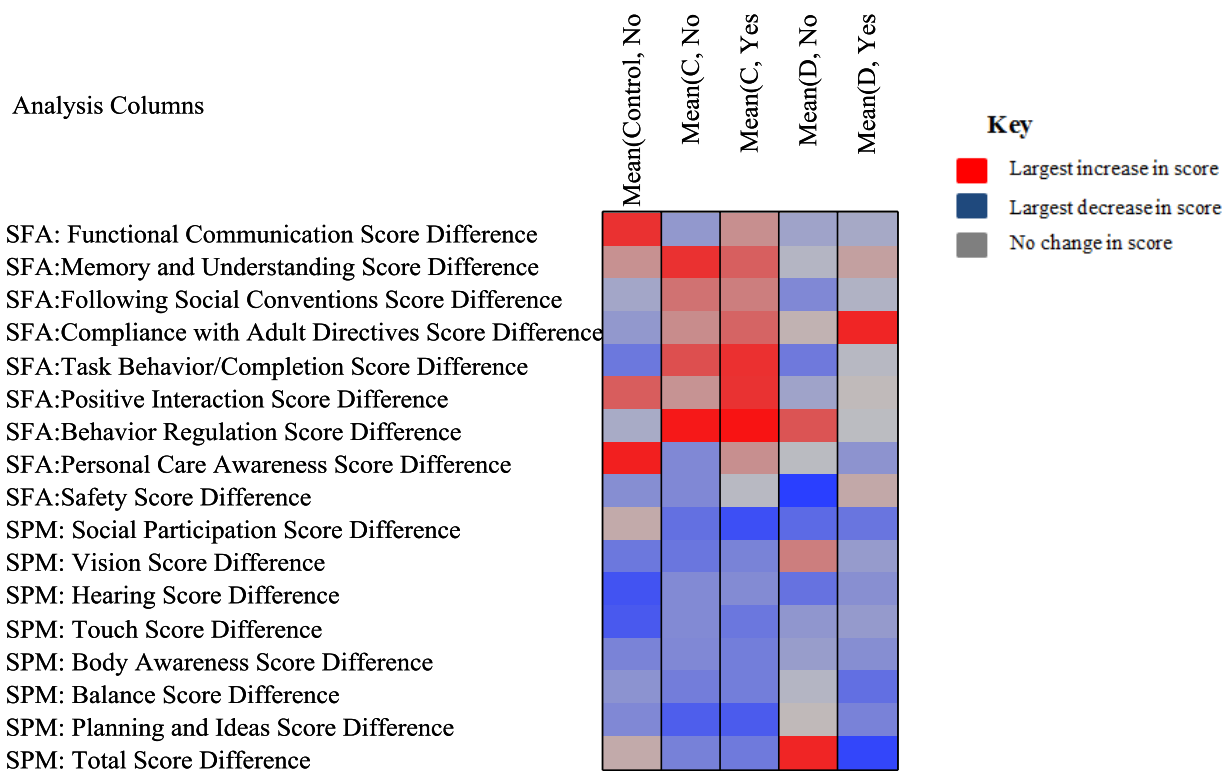


Figure 4.2. Cell plot displaying the second grade intervention classes, classes C and D, and the control group. Classes C and D are separated into the students that received the Follow-Up Alert Research Study and those that did not. For the SFA, a higher score indicates better functioning. For the SPM-C, a lower score indicates better functioning. The largest difference in score is between the students who received follow-up Alert Programming and those that did not in class D.

The scores for SFA and SPM-C were classified as no difference, probable difference, and definite difference in accordance to the assessments' cut-off scores for each student on each item on the assessments. An analysis was completed examining how many students in each sub-group got better, got worse, or remained the same in relation to the cut-off scores (See Table 4.1). Of the total eight students in the control group, one student changed from probable difference to definite difference, one student changed from no difference to probable difference, and six students started with no difference and remained in that category. Therefore, 25% of the control group's cut-off scores declined. Of the total eight students in the intervention group in Class D, three students began as having a definite difference with two remaining the same and one changing to no difference, four students began as having a probable difference with two remaining probable and two changing to no difference, and two students began with no difference and remained in that category. Therefore, 37.5% of the intervention group in Class D increased their cut-off score following the Follow-Up Alert Programming. Overall, 37.5% of the students who received Alert Programming in Class D increased their cut-off score, while no students in any other second grade classes increased their cut-off score. A Fisher's Exact Test showed a significant difference at the 0.05 level in the cut-off scores between the groups from pretest to posttest.

Table 4.1 Table displaying the number and percentage of students in the second grade classes, classes C and D, and the control group. The classes are separated to show the change in the students that received the Follow-Up Alert Programming and those that did not.

Count Row %	Got Better	Got Worse	No Change	Total
C No AP Intervention	0 <i>0.00</i>	0 <i>0.00</i>	9 <i>100.00</i>	9
C AP Intervention	0 <i>0.00</i>	1 <i>14.29</i>	6 <i>85.71</i>	7
Control No AP Intervention	0 <i>0.00</i>	2 <i>25.00</i>	6 <i>75.00</i>	8
D No AP Intervention	0 <i>0.00</i>	0 <i>0.00</i>	6 <i>100.00</i>	6
D AP Intervention	3 <i>37.50</i>	0 <i>0.00</i>	5 <i>62.50</i>	8
Total	3	3	32	38

Bar graphs for the intervention group and non-intervention group were created for each item of the SFA and SPM-C showing the distribution of students whose cut-off score increased, decreased, or remained the same. Researchers examined the bar graphs and chose six items, three items from SPM-C and three items from SFA, which showed the most changes, either in scores increasing or decreasing. The items chosen included Memory and Understanding, Compliance with Adult Directives, Safety, Body Awareness, Balance and Motion, and Planning and Ideas (See Figure 4.3 for bar graphs and Table 4.2 for the percentage of change and level of significance of change in the chosen items). A Fisher’s Exact Test for the item table revealed a significant difference at the .05 level between the groups for Memory and Understanding, Compliance with Adult Directives, Safety, Body Awareness, and Balance and Motion. No significant difference was found for Planning and Ideas.

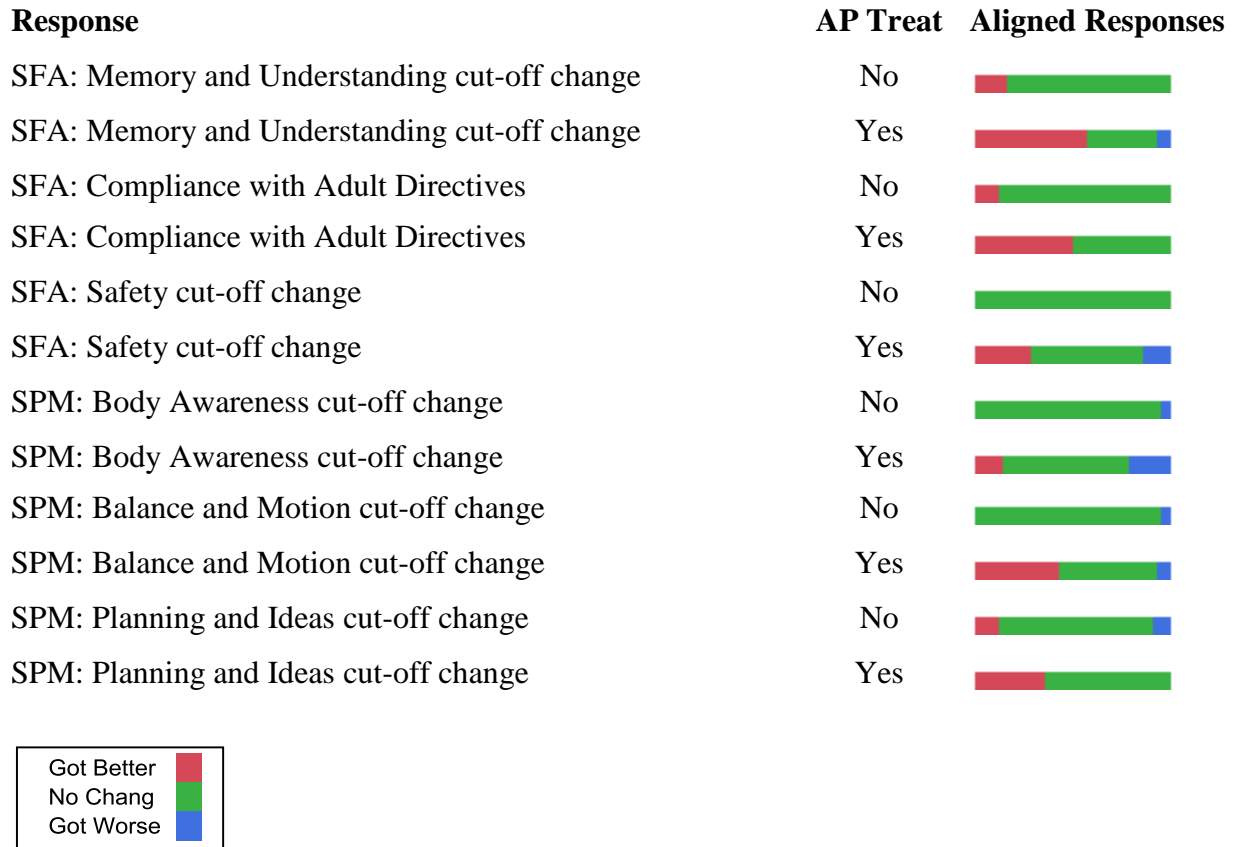


Figure 4.3 Bar graphs displaying the number of students that increased, decreased, or remained the same in relation to the cut-off score in SPM-C and SFA.

In the area of Memory and Understanding, 8/14 students or 57.1%, in the experimental group increased their cut-off score from pretest to posttest, while only 4/24 students, or 16%, in the control group increased their cut-off score. For Compliance with Adult Directives, 7/14 students or 50%, in the experimental group increased their cut-off score from pretest to posttest, while only 3/24 students or 12%, in the control group achieved a better cut-off score. For Safety, 4/14 students or 28.5%, in the experimental group got better and no students increased their score in the control group. In the area of Body Awareness, 2/14 students or 14.3%, in the experimental group got better, while none of the students in the control group increased their cut-off score. However, in this same area, 3/14 students, or 21.4%, in the experimental group

decreased their cut-off score, while 1/24 students, or 4.2%, in the control group decreased their score. In the area of Balance and Motion 6/14 students, or 46.9%, in the experimental group increased their cut-off score from pretest to posttest, while none of the students in the control group increased their score. Lastly, although there was no statistically significant difference found between the groups in the area of Planning and Ideas, there are qualitative differences present. In this area, 5/14 students or 35.7%, in the experimental group increased their cut-off score, while only 3/24 students, or 12.5%, in the control group got better. Also, 2/24 students or 8.3%, in the control group got worse in this area, while none of the students in the experimental group decreased their score.

Table 4.2 Table displaying the percentage of students that increased, decreased, or remained the same in relation to the cut-off score on three SFA subtests and three SPM-C subtests. The p-value is shown indicating if there is a significant difference in the changes.

Change in Cut-Off Score					
Response	Treat	Got Better	No Change	Got Worse	P-value
SFA: Memory and Understanding cut-off change	No	17%	83%	0%	0.0053
	Yes	57%	36%	7%	
SFA: Compliance with Adult Directives	No	13%	88%	0%	0.0207
	Yes	50%	50%	0%	
SFA: Safety cut-off change	No	0%	100%	0%	0.0011
	Yes	29%	57%	14%	
SPM: Body Awareness cut-off change	No	0%	96%	4%	0.0252
	Yes	14%	64%	21%	
SPM: Balance and Motion cut-off change	No	0%	96%	4%	0.0005
	Yes	43%	50%	7%	
SPM: Planning and Ideas cut-off change	No	13%	79%	8%	0.2658
	Yes	36%	64%	0%	

It was the original intention of the research to compare the changes in sensory processing and school functioning skills of those who received Alert Programming in kindergarten and received follow-up Alert Programming to those that only received the follow-up Alert Programming in first or second grade. This would assess if students who had previous experience with the AP would respond differently to follow-up programming than students with

no previous experience. Also, the researcher intended to compare the changes from pretest to posttest of the follow-up Alert Programming between the first grade students and the second grade students to assess if more gains were made in one grade versus the other. Upon further review, it was agreed that these comparisons were beyond the scope of the present analysis.

Part II: Durability of Kindergarten Alert Programming

During the kindergarten years of 2010-2011 and 2011-2012, the AP was implemented through a generalized, classroom-wide approach at the Oakwood School. These previous studies demonstrated and replicated the general application of the AP with kindergarten students and showed it was effective in generating improvements in overall classroom functioning, as measured using the School Functional Assessment – Part III (SFA), and sensory processing, as measured using the Sensory Processing Measure-Main Classroom Form (SPM-C). The primary goal of this component of the study was to determine if the gains made during the kindergarten Alert Programming were maintained until the first or second grade year.

The researchers retrospectively stratified the control and intervention groups from the kindergarten years by the same risk criteria as for the Follow-Up Alert Program Research Study. As stated above, the criteria included a student having a probable or definite difference in one of four SPM-C subtests, including Touch, Vision, Hearing, or Balance and Motion, or in the Total SPM-C Score. Spaghetti graphs were created for three SFA subtests, including Compliance with Adult Directives, Memory and Understanding, and Safety and for six SPM-C subtests, including Touch, Vision, Hearing, Balance and Motion, Body Awareness, Planning and Ideas and SPM-C Total. The spaghetti graphs display the distribution of all students' scores for kindergarten pretest, kindergarten posttest, and second grade pretest. Further, the spaghetti plots for each measure were stratified to show the distribution of each student for the at-risk students in the

control group, the not-at-risk students in the control group, the at-risk students in the intervention group, and the not-at-risk students in the intervention group. In order to preserve statistical power and to assess the durability for the longest period of time, only the second grade classes were assessed. The spaghetti graphs were used to assess the trends of change in scores comparing kindergarten pretest, kindergarten posttest, and second grade pretest. For clarity, an overall summary of the means and distribution of the means for the trends displayed in each graph is shown in Table 4.3 (SFA subtests) and Table 4.4 (SPM-C subtests).

Table 4.3 The number of participants, mean, and standard deviation for the “at risk” control and intervention groups and the “not-at-risk” control and intervention groups over three time-points, including kindergarten pretest, kindergarten posttest, and second grade pretest. The figures are shown for three SFA subtests, including Memory and Understanding, Compliance with Adult Directives, and Safety.

SFA	Pretest Risk of Kindergarten	N	2010-2011 Kindergarten Pretest			2010-2011 Kindergarten Posttest			2012-2013 2 nd grade Pretest		
			N	Mean	Std	N	Mean	Std	N	Mean	Std
SFA: Memory and Understanding											
Control	No Risk	6	6.0	96.5	8.6	6.0	96.3	6.2	6.0	81.8	21.1
Control	Risk	2	2.0	62.0	0.0	2.0	76.5	3.5	2.0	75.5	24.7
K Intervention	No Risk	10	10.0	91.0	12.6	10.0	98.5	4.7	10.0	94.9	13.8
K Intervention	Risk	9	9.0	83.4	17.6	9.0	92.4	11.4	9.0	86.7	20.5
SFA: Compliance with Adult Directives											
Control	No Risk	6	6	94	11.61	6	92.5	18.37	6	90	11.45
Control	Risk	2	2	61	0	2	71	2.828	2	59.5	10.61
K Intervention	No Risk	10	10	89.3	19.2	10	93.2	15.09	10	87.5	20.78
K Intervention	Risk	9	9	70.44	11.88	9	85	12.4	9	64.78	16.57
SFA: Safety											
Control	No Risk	6	6	100	0	6	100	0	6	100	0
Control	Risk	2	2	95.5	6.364	2	100	0	2	86	7.071
K Intervention	No Risk	10	10	96	9.899	10	97.4	8.222	10	100	0
K Intervention	Risk	9	9	91.56	17.8	9	94.78	8.348	9	77.78	17.48

Table 4.4 The number of participants, mean, and standard deviation for the “at risk” control and intervention groups and the “not-at-risk” control and intervention groups over three time-points, including kindergarten pretest, kindergarten posttest, and second grade pretest. The figures are shown for seven SPM-C subtests, including Vision, Hearing, Touch, Body Awareness, Balance and Motion, Planning and Ideas, and Total Score.

SPM-C	Pretest Risk of Kindergarten	N	2010-2011 Kindergarten Pretest			2010-2011 Kindergarten Posttest			2012-2013 2 nd Grade Pretest		
			N	Mean	Std	N	Mean	Std	N	Mean	Std
SPM: Vision											
Control	No Risk	6	6	9.67	0.82	6	7.5	1.22	6	8.83	1.72
Control	Risk	2	2	11.5	0.71	2	9.5	3.54	2	9.5	2.12
K Intervention	No Risk	10	10	7.9	1.37	10	7.2	0.42	10	8.5	2.07
K Intervention	Risk	9	9	10	3.87	9	8.67	3.24	9	10	3.28
SPM: Hearing											
Control	No Risk	6	6	7.67	0.82	6	7.33	0.82	6	8.17	1.94
Control	Risk	2	2	10	1.41	2	10.5	3.54	2	10	0
K Intervention	No Risk	10	10	7.5	0.71	10	8	1.41	10	7.6	1.35
K Intervention	Risk	9	9	13	3.28	9	11.89	3.55	9	10.33	3.39
SPM: Touch											
Control	No Risk	6	6	8	0	6	8.17	0.41	6	8.83	1.6
Control	Risk	2	2	8.5	0.71	2	8	0	2	9	1.41
K Intervention	No Risk	10	10	8.4	0.52	10	9.6	1.78	10	8.2	0.42
K Intervention	Risk	9	9	10.56	1.42	9	10.89	2.26	9	8.89	1.17
SPM: Body Awareness											
Control	No Risk	6	6	8	0.89	6	7.33	0.52	6	8.5	3.21
Control	Risk	2	2	14	2.83	2	13.5	7.78	2	7.5	0.71
K Intervention	No Risk	10	10	8.4	1.65	10	7.2	0.42	10	8.3	3.47
K Intervention	Risk	9	9	14.22	4.66	9	10.11	3.86	9	11.22	5.07
SPM: Balance and Motion											
Control	No Risk	6	6	10.67	1.37	6	9.33	0.52	6	11.83	3.19
Control	Risk	2	2	14	2.83	2	15	7.07	2	13.5	0.71
K Intervention	No Risk	10	10	10.1	1.29	10	9.6	1.07	10	12.1	5.65
K Intervention	Risk	9	9	17.56	4.82	9	13.89	3.82	9	15.78	6.28
SPM: Planning and Ideas											
Control	No Risk	6	6	20.67	8.33	6	14.67	4.5	6	13	5.48
Control	Risk	2	2	24.5	3.54	2	18.5	6.36	2	25	8.49
K Intervention	No Risk	10	10	13.4	5.4	10	12.8	3.61	10	12.7	3.09
K Intervention	Risk	9	9	16.33	6.56	9	17.22	4.63	9	16.78	6.53
SPM: Total											
Control	No Risk	6	6	48	3.58	6	43.67	2.34	6	50.33	11.64
Control	Risk	2	2	62	7.07	2	55	7.07	2	54	5.66
K Intervention	No Risk	10	10	46.5	3.69	10	46.4	4.84	10	48.7	12.74
K Intervention	Risk	9	9	70	12.4	9	60.78	12.26	9	59.11	16.41

The following summarizes the responses in each of the individual categories. In the subtest of Compliance with Adult Directives (See Figure 4.4 for the spaghetti graph and Table 4.5 for the overview of change in the spaghetti graph), the at-risk control group, at-risk intervention group, and not-at-risk intervention group showed trends of increased scores from pretest in kindergarten to posttest in kindergarten. However, these three groups showed a decreased trend from kindergarten posttest to second grade pretest. The not-at-risk control group showed a trend of slight decrease from kindergarten pretest to kindergarten posttest and a further trend of slight decreased from kindergarten posttest to second grade pretest. Lastly, the at-risk intervention group showed a larger trend of decline comparative to the not-at-risk intervention group.

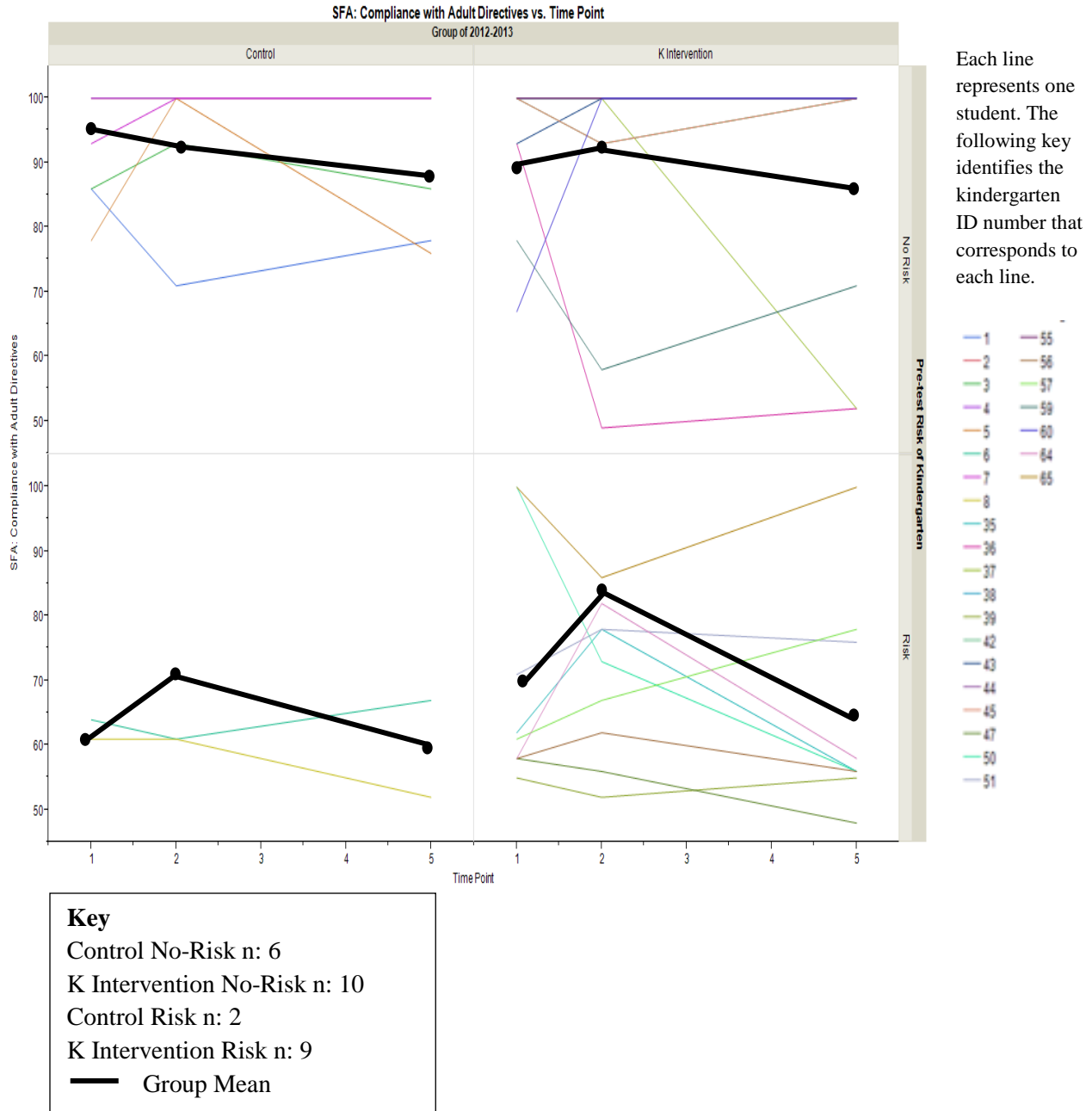


Figure 4.4. Spaghetti graphs displaying the performance of the control and second grade students on the SFA Measure Compliance with Adult Directives at kindergarten pretest, kindergarten posttest, and second grade pretest. The graphs are separated into at-risk control and intervention group and not-at-risk control and intervention group. The mean scores are shown in black to assess trends in the scores.

All groups showed a trend of increasing scores from kindergarten pretest to kindergarten posttest in the SFA subtest of Memory and Understanding (See Figure 4.5, and Table 4.5). Also,

all groups showed a trend of decreasing score from kindergarten posttest to second grade pretest. Overall, the not-at-risk control group showed the largest trend of decrease from kindergarten posttest to second grade pretest.

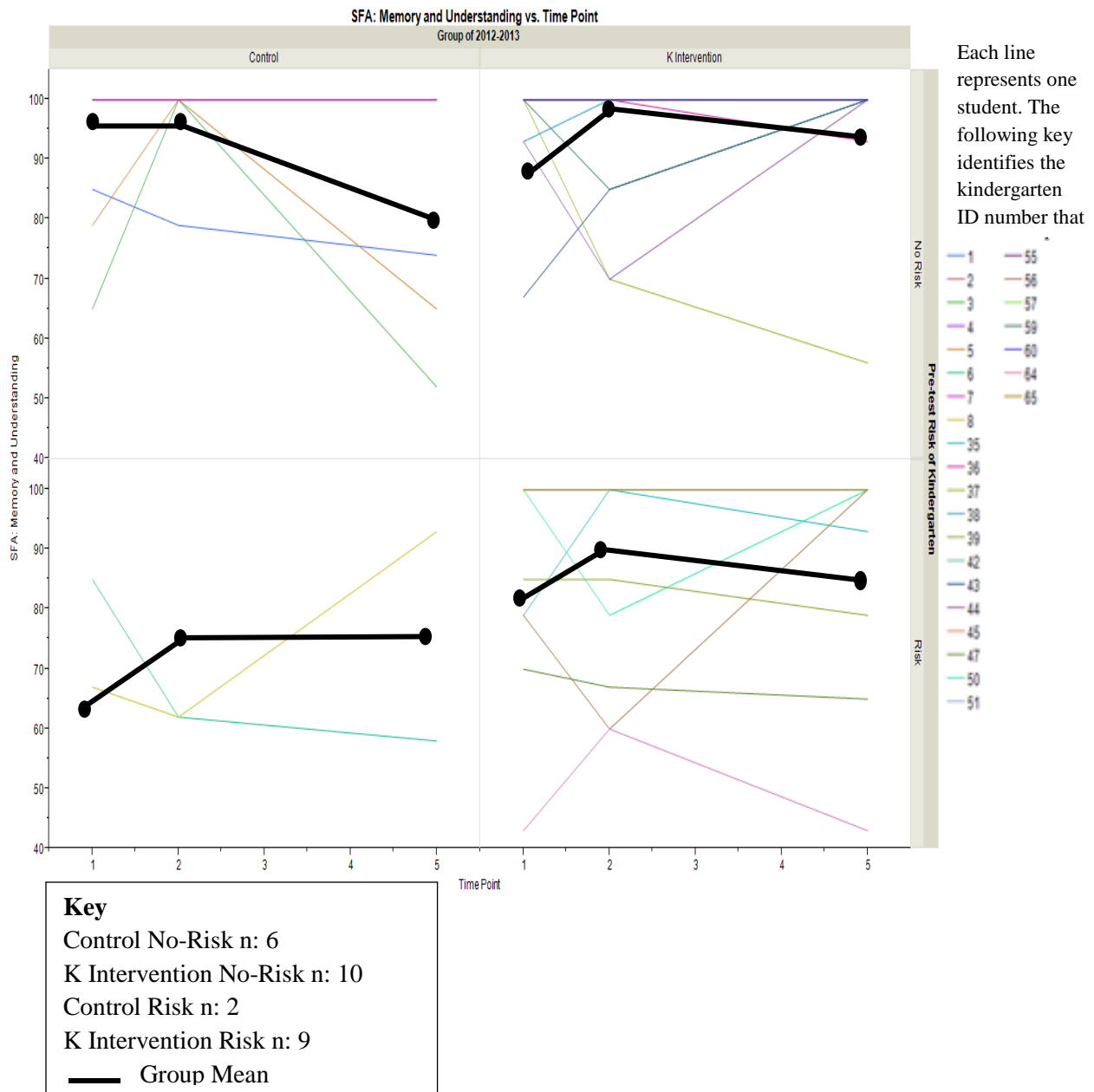


Figure 4.5. Spaghetti graphs displaying the performance of the control and second grade students on the SFA Measure Memory and Understanding at kindergarten pretest, kindergarten posttest, and second grade pretest. The graphs are separated into at-risk control and intervention group and not-at-risk control and intervention group. The mean scores are shown in black to assess trends in the scores.

In the SFA Safety (See Figure 4.6 and Table 4.5) subtest there are interesting trends. The not-at-risk intervention group began with trends slightly below 100 percent at kindergarten pretest and maintained a trend of a similar score at kindergarten posttest. The not-at-risk control group began with all but one student at 100 percent and by kindergarten posttest all students had scored 100 percent. Both the not-at-risk control and intervention groups had all students scoring 100 percent at second grade pretest. Both the at-risk control and intervention groups showed a trend of increasing score from kindergarten pretest to kindergarten posttest. However, both groups showed a trend of decline in scores from kindergarten posttest to second grade pretest. The most variation of individual scores of all groups occurred in the change from kindergarten posttest to second grade pretest in the at-risk control group.

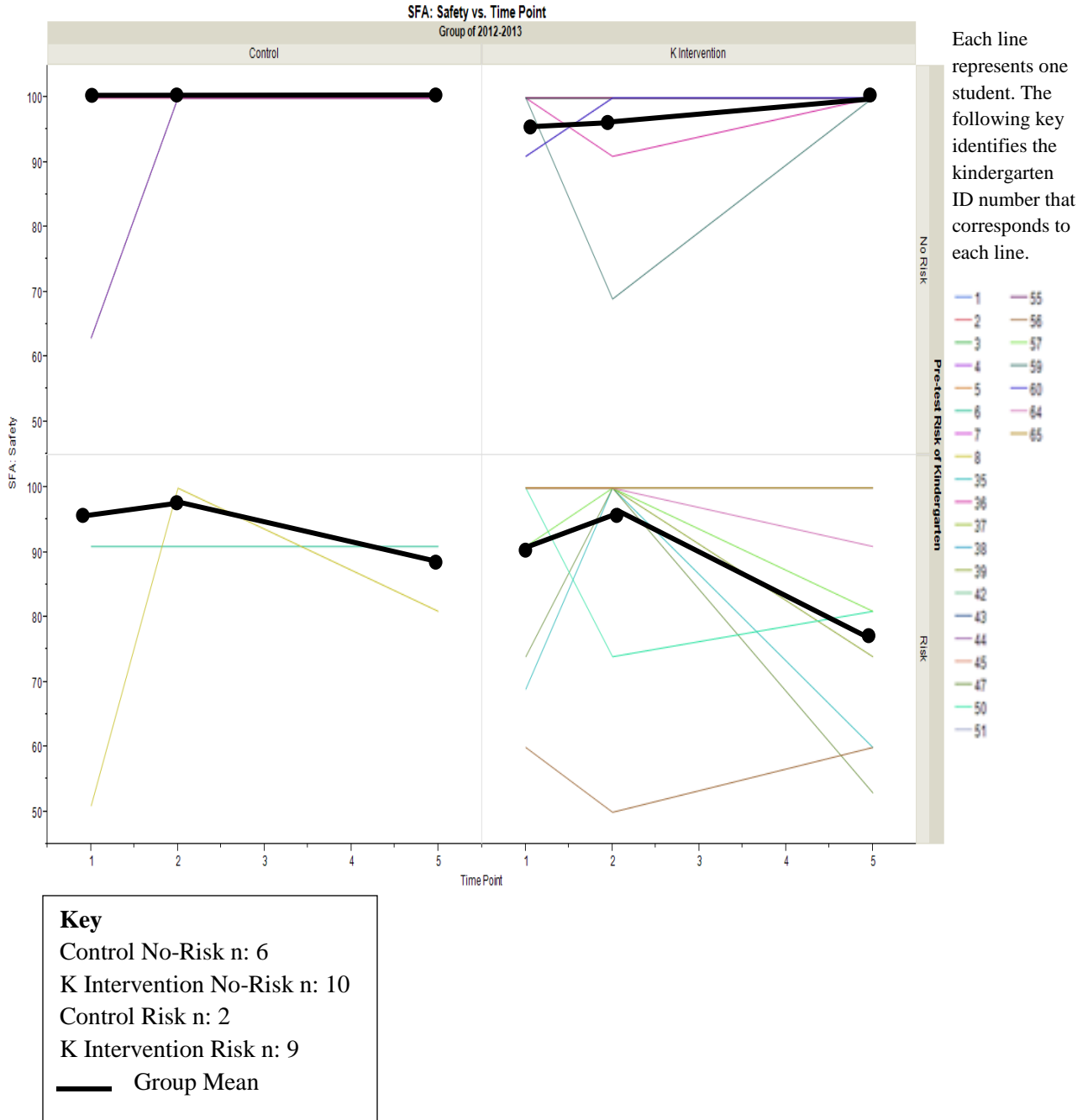


Figure 4.6. Spaghetti graphs displaying the performance of the control and second grade students on the SFA Measure Safety at kindergarten pretest, kindergarten posttest, and second grade pretest. The graphs are separated into at-risk control and intervention group and not-at-risk control and intervention group. The mean scores are shown in black to assess trends in the scores.

Table 4.5 The trend of change in scores for the “at-risk” control and intervention groups and the “not-at-risk” control and intervention groups at two time-points. The first time-point is the trend of change from kindergarten pretest to kindergarten posttest and the second time-point is the trend of change from kindergarten posttest to second grade pretest. The trends are displayed for three SFA subtests, including Compliance with Adult Directives, Memory and Understanding, and Safety.

Subtest/Figure	Group	Change in scores Kindergarten pretest to Kindergarten Posttest	Change in scores Kindergarten Posttest to Second Grade pretest
SFA: Compliance with Adult Directives Figure 4.4	Control Not-At-Risk	Slight Decrease	Slight Decrease
	Control At-Risk	Increase	Decrease
	Intervention Not-At-Risk	Increase	Decrease
	Intervention At-Risk	Increase	Decrease
SFA: Memory and Understanding Figure 4.5	Control Not-At-Risk	Increase	Decrease
	Control At-Risk	Increase	Decrease
	Intervention Not-At-Risk	Increase	Decrease
	Intervention At-Risk	Increase	Decrease
SFA: Safety Figure 4.6	Control Not-At-Risk	Increase	Maintains
	Control At-Risk	Increase	Decrease
	Intervention Not-At-Risk	Maintains	Increase
	Intervention At-Risk	Increase	Decrease

In the subtest of SPM-C Vision (See Figure 4.7 and Table 4.6), all four of the groups had a decrease in score, or made gains from kindergarten pretest to kindergarten posttest. The largest trend of score decrease was seen in the at-risk intervention group and the smallest trend of score decrease was seen in the not-at-risk intervention group. Also, all four groups showed an increase in score from kindergarten posttest to second grade pretest. All of the groups showed trends of returning to similar scores for second grade pretest as kindergarten pretest, except the not-at-risk control group whose scores were slightly below baseline.

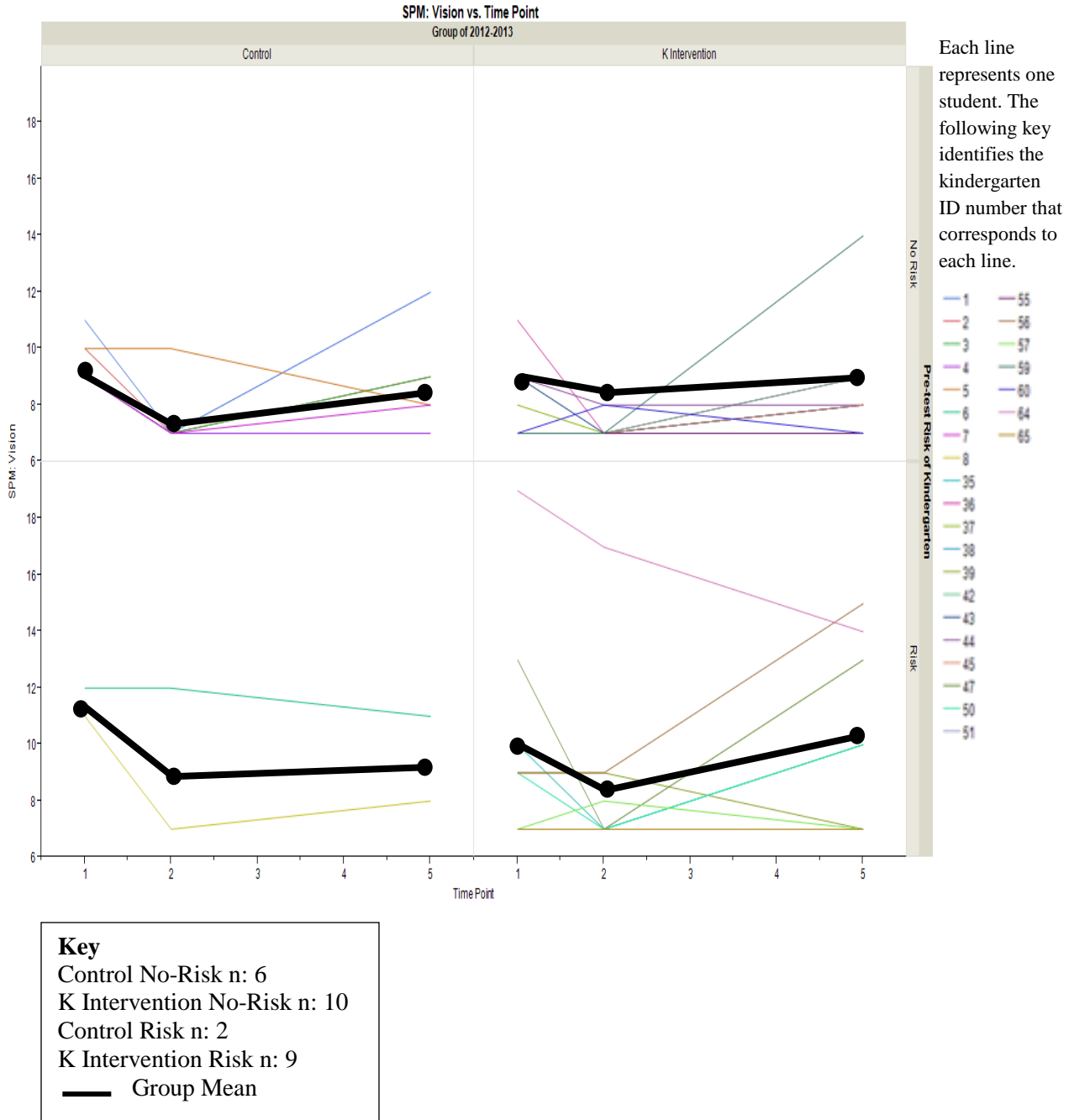


Figure 4.7. Spaghetti graphs displaying the performance of the control and second grade students on the SPM-C Measure Vision at kindergarten pretest, kindergarten posttest, and second grade pretest. The graphs are separated into at-risk control and intervention group and not-at-risk control and intervention group. The mean scores are shown in black to assess trends in the scores.

SPM-C Hearing (See Figure 4.8 and Table 4.6) showed that both the control and intervention at-risk groups began with higher scores for kindergarten pretest than both not-at-risk groups. The control groups showed trends of little change occurring from kindergarten pretest to kindergarten posttest, with much variation in the score of the at-risk control group. The at-risk intervention group showed trends of decrease in score than the not-at-risk intervention group, while the not-at-risk intervention group showed trends of slight increase from pretest to posttest in kindergarten. By the second grade pretest period the control at-risk group had shown trends of little change, while the control not-at-risk group had shown a trend to slightly increase. At second grade pretest, the intervention not-at-risk group had returned to baseline and the at-risk group had shown a trend of further decrease in score.

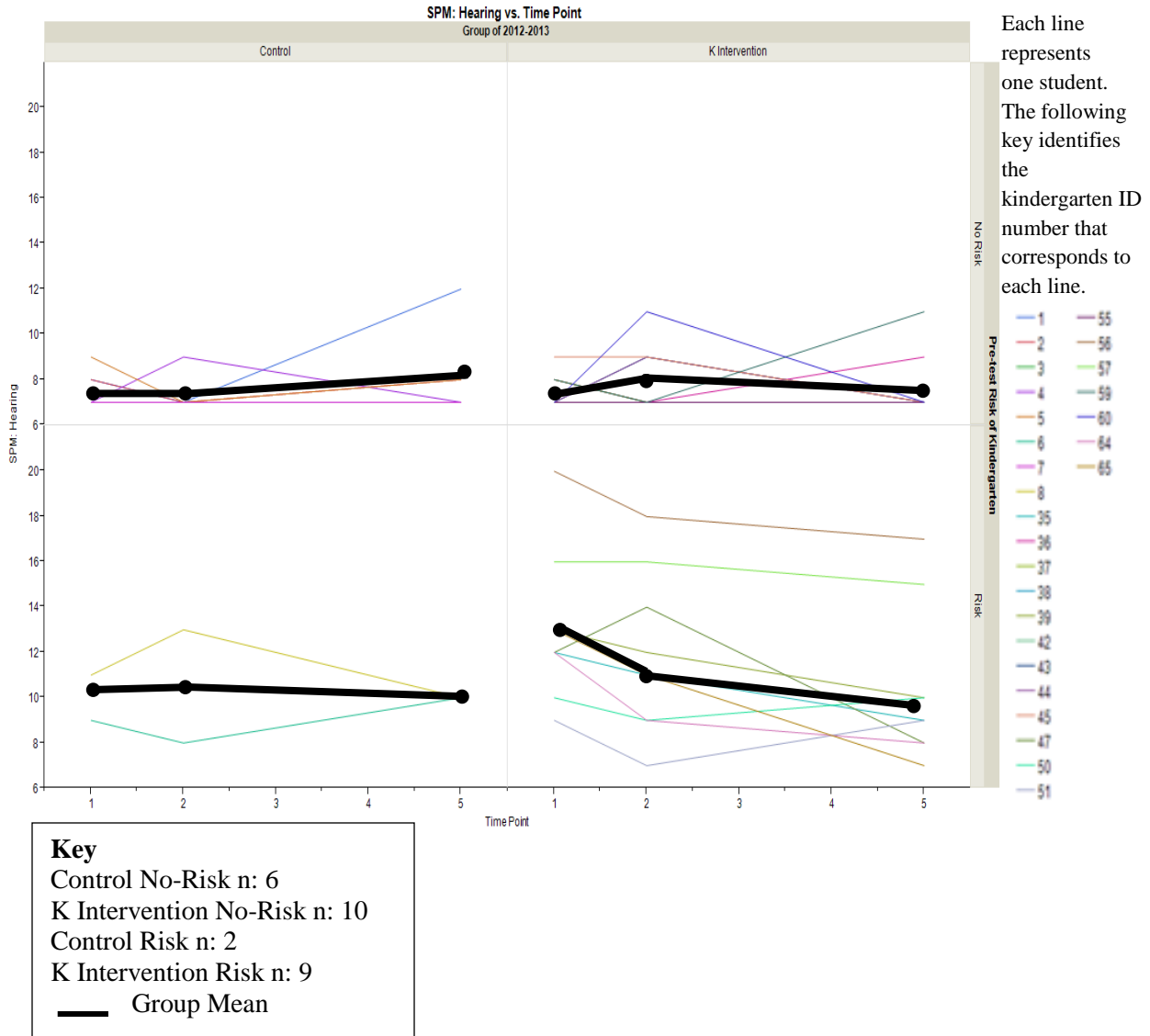


Figure 4.8 Spaghetti graphs displaying the performance of the control and second grade students on the SPM-C subtest Hearing at kindergarten pretest, kindergarten posttest, and second grade pretest. The graphs are separated into at-risk control and intervention group and not-at-risk control and intervention group. The mean scores are shown in black to assess trends in the scores.

The SPM-C subtest of Touch (See Figure 4.9 and Table 4.6) showed very interesting and contrasting trends between the control and intervention groups. The control not-at-risk group showed very little if any trend for change while the at-risk control group showed a slight decrease in score from kindergarten pretest to kindergarten posttest. Both of the intervention groups showed an increase in score from pretest to posttest in kindergarten, with the not-at-risk

group showing a greater trend of increase. However, both intervention groups showed a trend of decreasing score from kindergarten posttest to second grade pretest, even below the score they began with for kindergarten pretest. Both of the control groups showed an increasing trend from kindergarten posttest to second grade pretest.

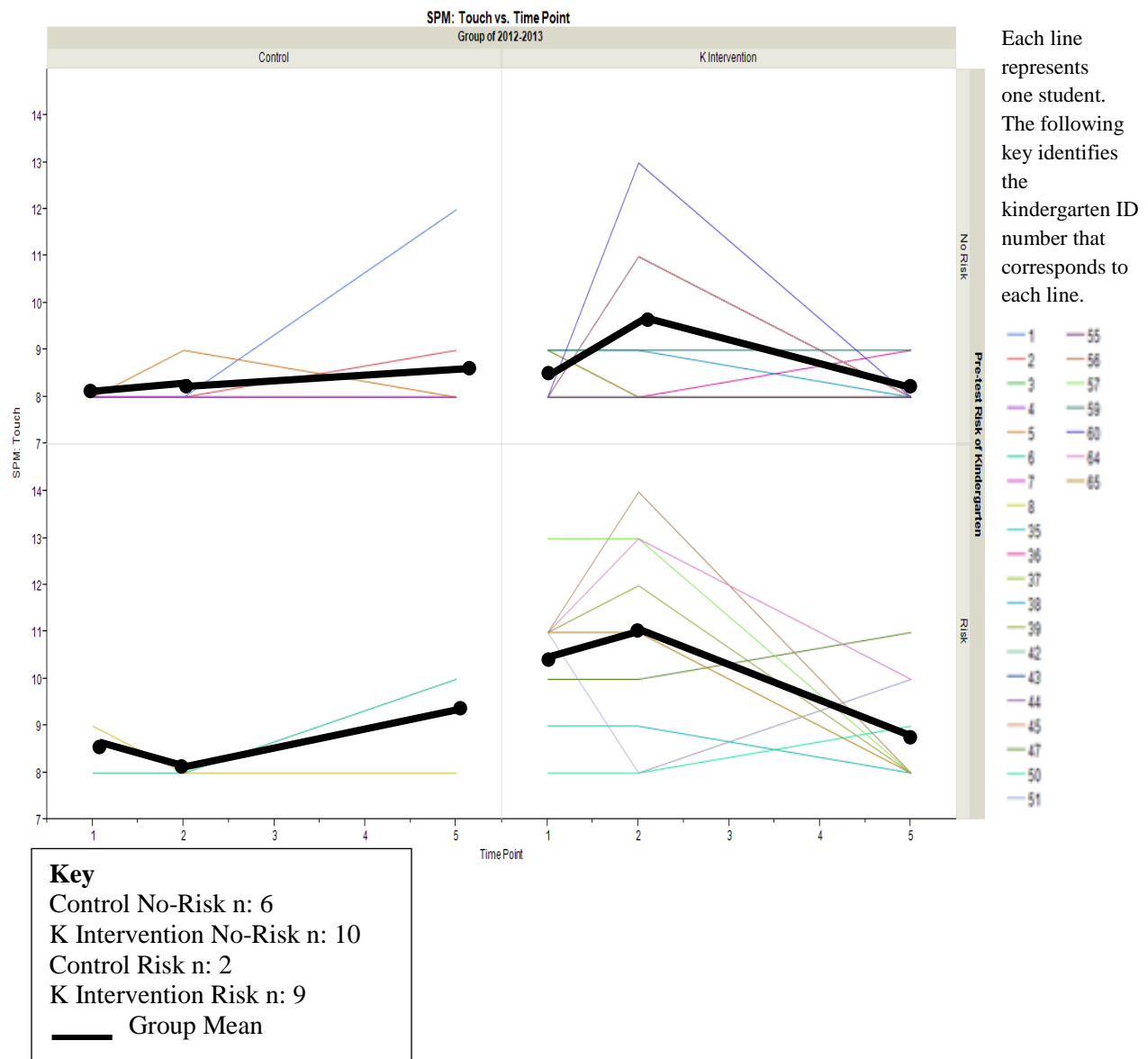


Figure 4.9 Spaghetti graphs displaying the performance of the control and second grade students on the SPM-C subtest Touch at kindergarten pretest, kindergarten posttest, and second grade pretest. The graphs are separated into at-risk control and intervention group and not-at-risk control and intervention group. The mean scores are shown to assess trends in the scores.

The next area that was analyzed was the SPM-C subtest of Body Awareness (See Figure 4.10 and Table 4.6). When looking from kindergarten pretest to kindergarten posttest, both control groups showed a trend of little change, however there was a large amount of variation in the at-risk control group. Both intervention groups showed a decrease in scores from kindergarten pretest to kindergarten posttest. The decrease in scores for the at-risk intervention group was greater than the not-at-risk intervention group. The scores of both the not-at-risk intervention and not-at-risk control group increase from kindergarten posttest to second grade pretest. The intervention at-risk group showed a trend of increase from kindergarten posttest to second grade pretest, but the scores tended to remain below that of kindergarten pretest. The at-risk control group showed a trend of strong decrease from kindergarten posttest to second grade pretest.

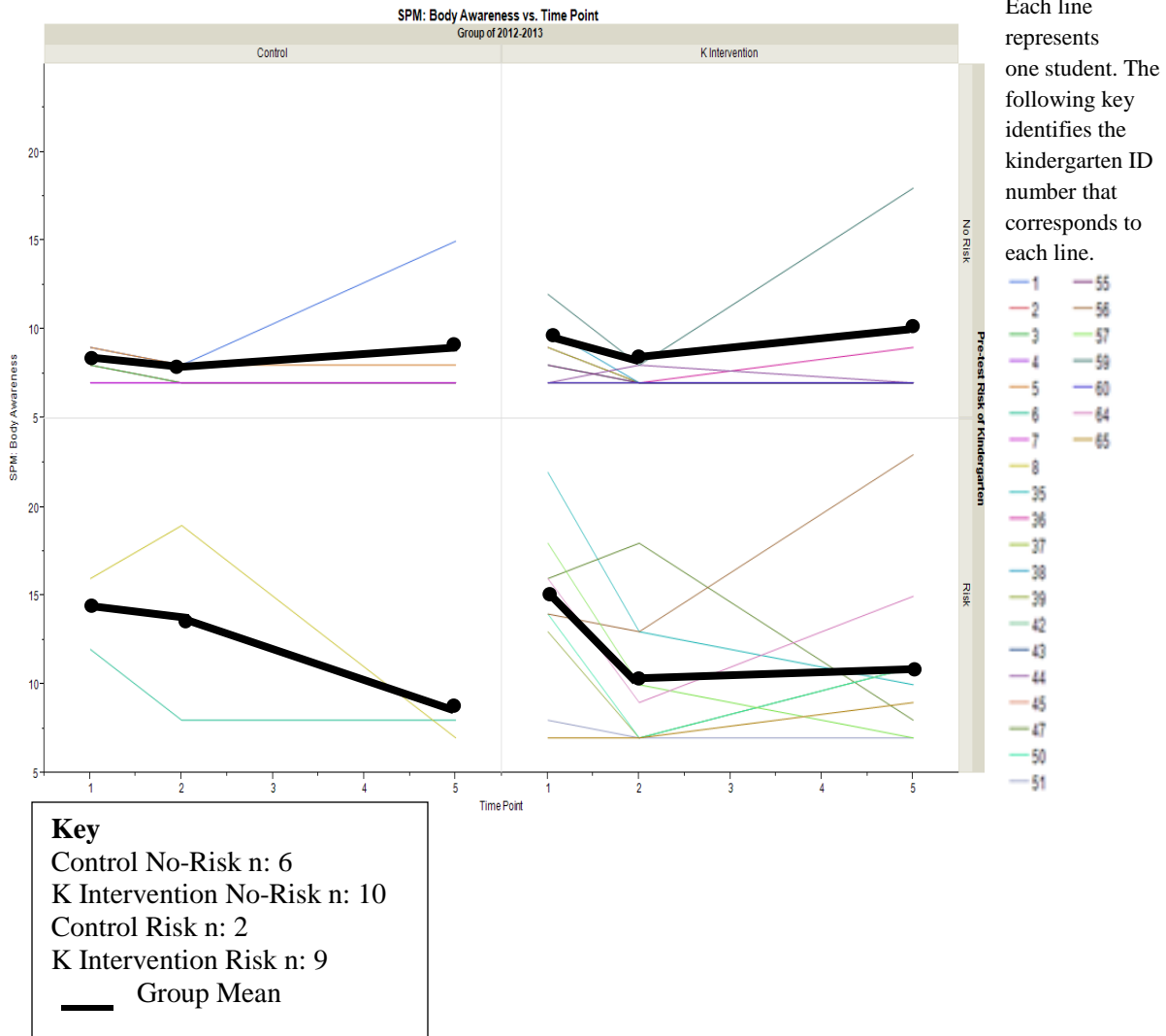


Figure 4.10. Spaghetti graphs displaying the performance of the control and second grade students on the SPM-C subtest Body Awareness at kindergarten pretest, kindergarten posttest, and second grade pretest. The graphs are separated into at-risk control and intervention group and not-at-risk control and intervention group. The mean scores are shown to assess trends in the scores.

Both not-at-risk groups showed similar trends in the Balance and Motion (See Figure 4.11 and Table 4.6) subtest of the SPM-C. Both groups showed trends of little change over all three time-points. As in several of the other areas, the control at-risk group showed little change over the three time-points, but there was a large amount of variation in the scores. The at-risk

intervention group showed a trend of decrease in scores from kindergarten pretest to kindergarten posttest and a slight increase to second grade pretest. There was also a large amount of variation displayed in the scores of the intervention at-risk group.

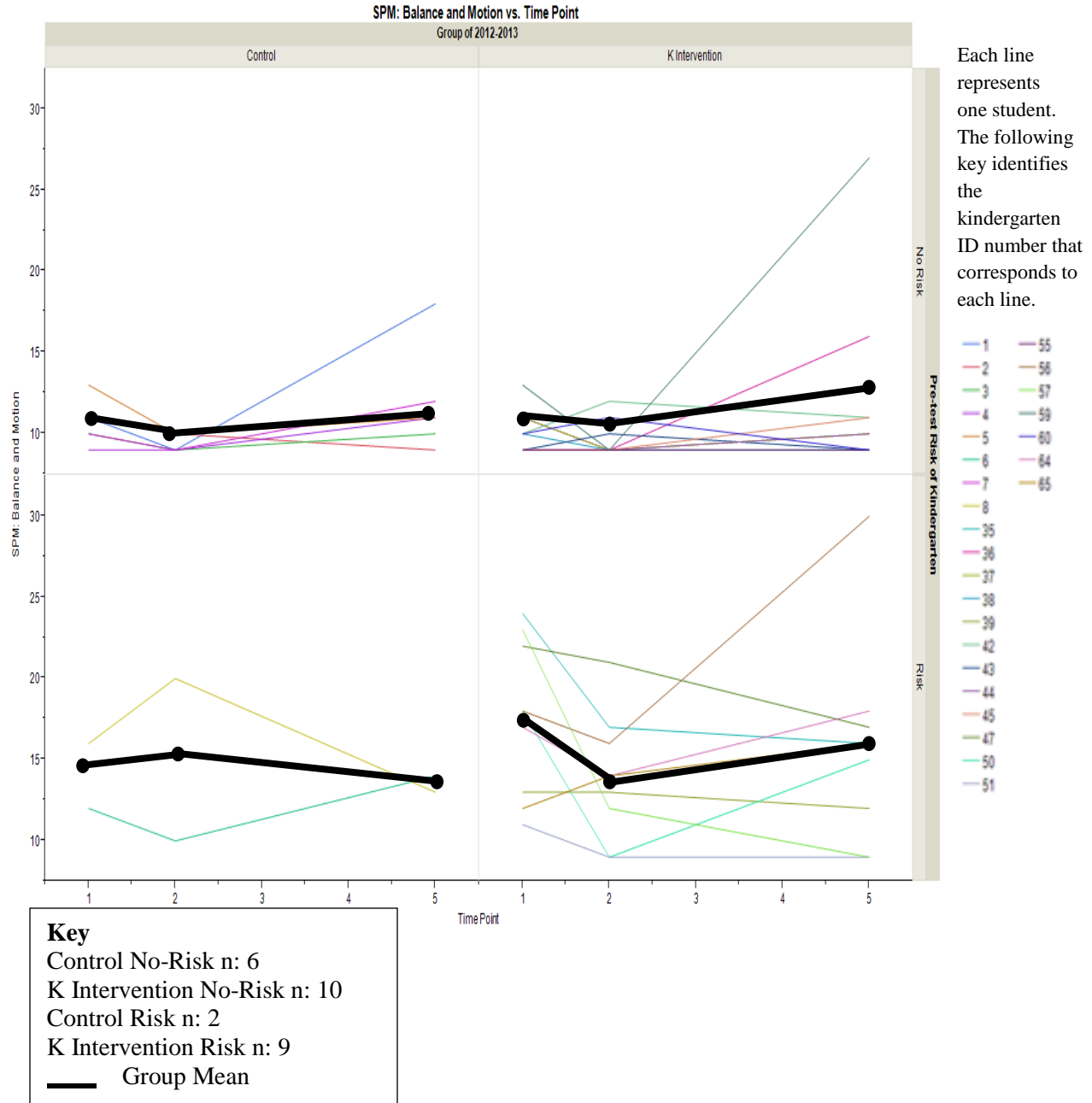


Figure 4.11. Spaghetti graphs displaying the performance of the control and second grade students on the SPM-C subtest Balance and Motion at kindergarten pretest, kindergarten posttest, and second grade pretest. The graphs are separated into at-risk control and intervention group and not-at-risk control and intervention group. The mean scores are shown to assess trends in the scores.

In the subtest of Planning and Ideas (See Figure 4.12 and Table 4.6), both control groups showed a trend of decreasing scores from kindergarten pretest to kindergarten posttest, and an increase to second grade pretest. Both intervention groups showed little change during all three time-points. However, in all four groups there was a large amount of variation and it was difficult to see trends or consistency in scoring at any of the three time-points.

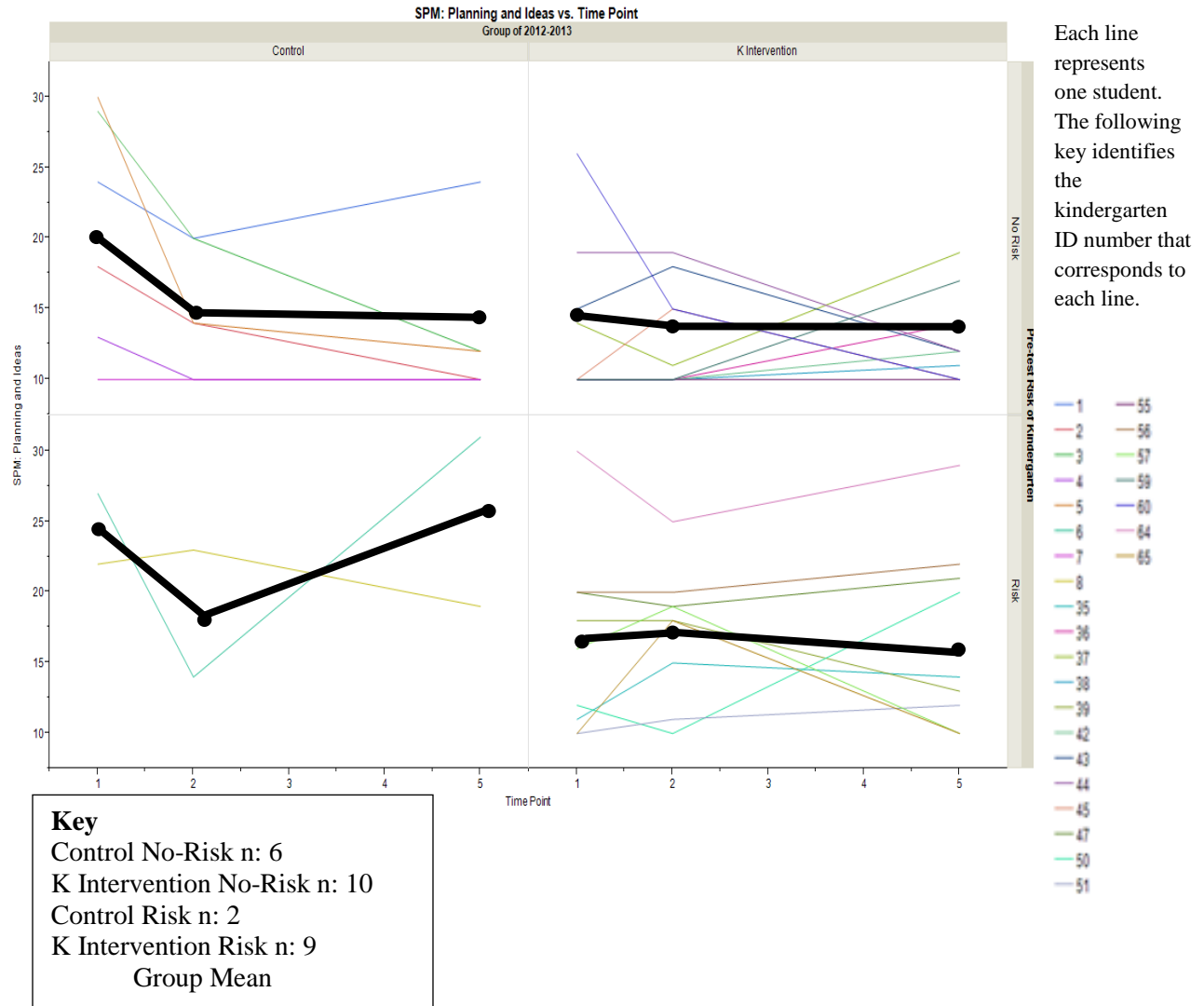
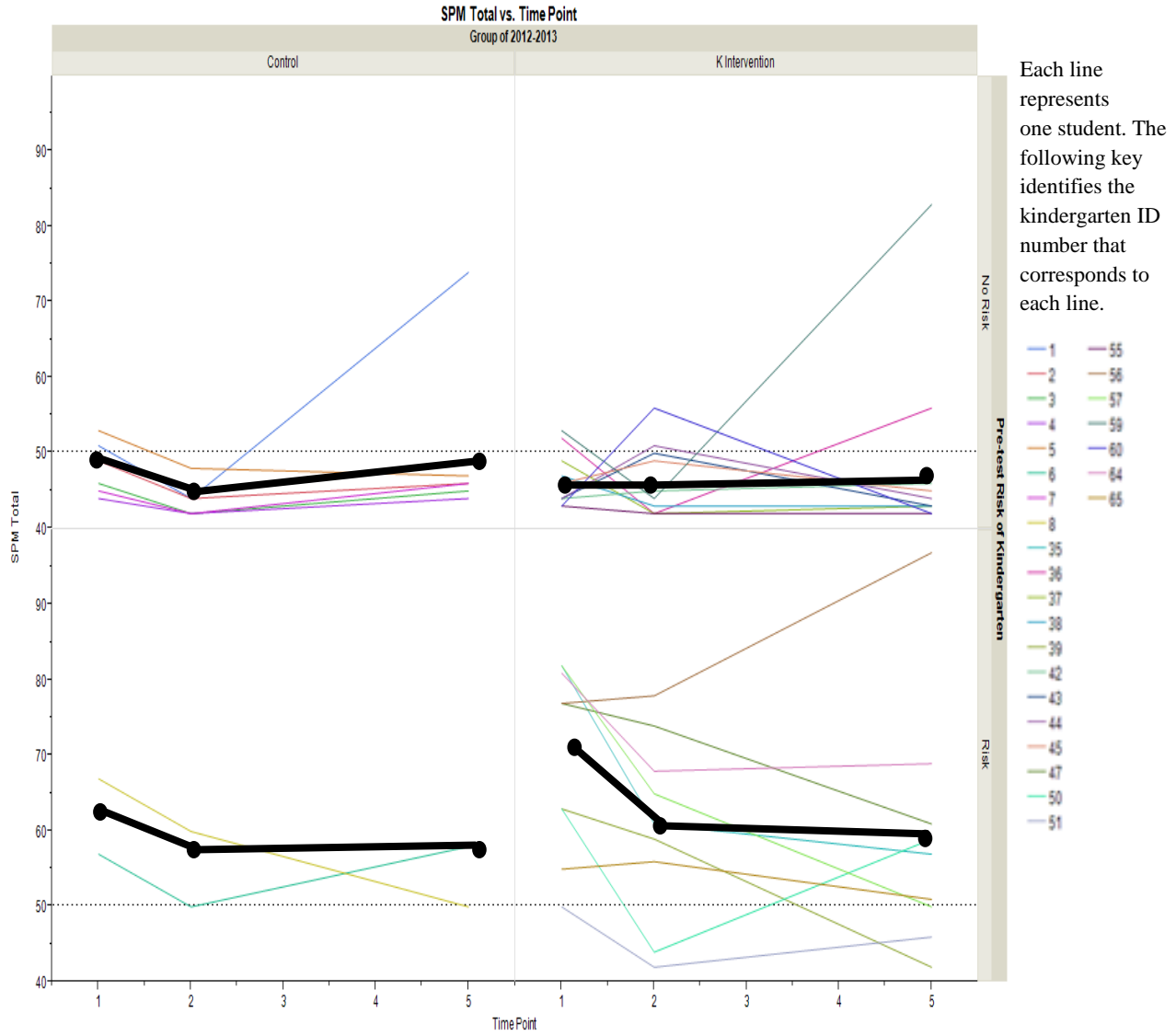


Figure 4.12. Spaghetti graphs displaying the performance of the control and second grade students on the SPM-C subtest Planning and Ideas at kindergarten pretest, kindergarten posttest, and second grade pretest. The graphs are separated into at-risk control and intervention group and not-at-risk control and intervention group. The mean scores are shown to assess trends in the scores.

The last subtest assessed was SPM-C Total Score (See Figure 4.13 and Table 4.6). Both of the at-risk groups showed baseline scores in kindergarten beginning higher than that of the not-at-risk groups. Both of the at-risk groups showed trends of decreasing scores from kindergarten pretest to kindergarten posttest, with a larger trend in the intervention at-risk group. Then, both of the groups showed a trend of little change from kindergarten posttest to second grade pretest, however there was large variation in the intervention not-at-risk group. Both of the not-at-risk groups showed trends of little change at any of the three time-points, with all scores remaining relatively low.



Key
Control No-Risk n: 6
K Intervention No-Risk n: 10
Control Risk n: 2
K Intervention Risk n: 9
Group Mean

Figure 4.13. Spaghetti graphs displaying the performance of the control and second grade students on the SPM-C Total at kindergarten pretest, kindergarten posttest, and second grade pretest. The graphs are separated into at-risk control and intervention group and not-at-risk control and intervention group. The mean scores are shown to assess trends in the scores.

Table 4.6. The trend of change in scores for the “at-risk” control and intervention groups and the “not-at-risk” control and intervention groups at two time-points. The first time-point is the trend of change from kindergarten pretest to kindergarten posttest and the second time-point is the trend of change from kindergarten posttest to second grade pretest. The trends are displayed for seven SPM-C subtests, including Vision, Hearing, Touch, Body Awareness, Balance and Motion, Planning and Ideas, and Total Score.

Subtest/Figure	Group	Change in scores 2010-2011 Kindergarten Pretest to 2010-2011 Kindergarten Posttest	Change in scores 2010-2011 Kindergarten Posttest to 2012- 2013 Second Grade Pretest
SPM: Vision Figure 4.7	Control Not-At-Risk	Decrease	Increase
	Control At-Risk	Decrease	Increase
	Intervention Not-At-Risk	Decrease	Increase
	Intervention At-Risk	Decrease	Increase
SPM: Hearing Figure 4.8	Control Not-At-Risk	Maintains	Slight Increase
	Control At-Risk	Maintains	Maintains
	Intervention Not-At-Risk	Slight Increase	Slight Decrease
	Intervention At-Risk	Decrease	Decrease
SPM: Touch Figure 4.9	Control Not-At-Risk	Maintains	Increase
	Control At-Risk	Slight Decrease	Increase
	Intervention Not-At-Risk	Increase	Decrease
	Intervention At-Risk	Increase	Decrease
SPM: Body Awareness Figure 5.0	Control Not-At-Risk	Maintains	Increase
	Control At-Risk	Maintains	Decrease
	Intervention Not-At-Risk	Decrease	Increase
	Intervention At-Risk	Decrease	Increase
SPM: Balance and Motion Figure 5.1	Control Not-At-Risk	Maintains	Maintains
	Control At-Risk	Maintains	Maintains
	Intervention Not-At-Risk	Maintains	Maintains
	Intervention At-Risk	Decrease	Slight Increase
SPM: Planning and Ideas Figure 5.2	Control Not-At-Risk	Decrease	Increase
	Control At-Risk	Decrease	Increase
	Intervention Not-At-Risk	Maintains	Maintains
	Intervention At-Risk	Maintains	Maintains
SPM: Total Figure 5.3	Control Not-At-Risk	Maintains	Maintains
	Control At-Risk	Decrease	Maintains
	Intervention Not-At-Risk	Maintains	Maintains
	Intervention At-Risk	Decrease	Maintains

Lastly, a line graph was created highlighting the change in mean scores over time for the students that were in the 2010-2011 control group and intervention group and are currently in second grade. Also, the difference between the “at-risk” group and the “not-at-risk” group over time is displayed. The graph shows that both of the “at-risk” groups began with higher scores than the “not-at-risk” groups, consistent with lower functioning in the at risk group. Also, the “at-risk” groups showed higher scores than the “not-at-risk” groups for all three time-points. However, the gap between the scores of the “at-risk” and “not-at-risk” groups was narrowed at kindergarten posttest and second grade pretest. A Fisher’s Exact Test was completed analyzing the relationship between the control group and experimental groups change over time (See Figure 4.14). Also a comparison between the “at-risk” group and the “not-at-risk” group change over time was performed. The Fisher’s Exact Test is not capable of showing where changes occur or in what group, but there was a change significant at the 0.05 level found in the four groups over time. Also, there was a significant difference at the 0.05 level found between the “at-risk” and “not-at-risk” groups. However, there was not a significant difference found between the changes made in the control group and the experimental group.

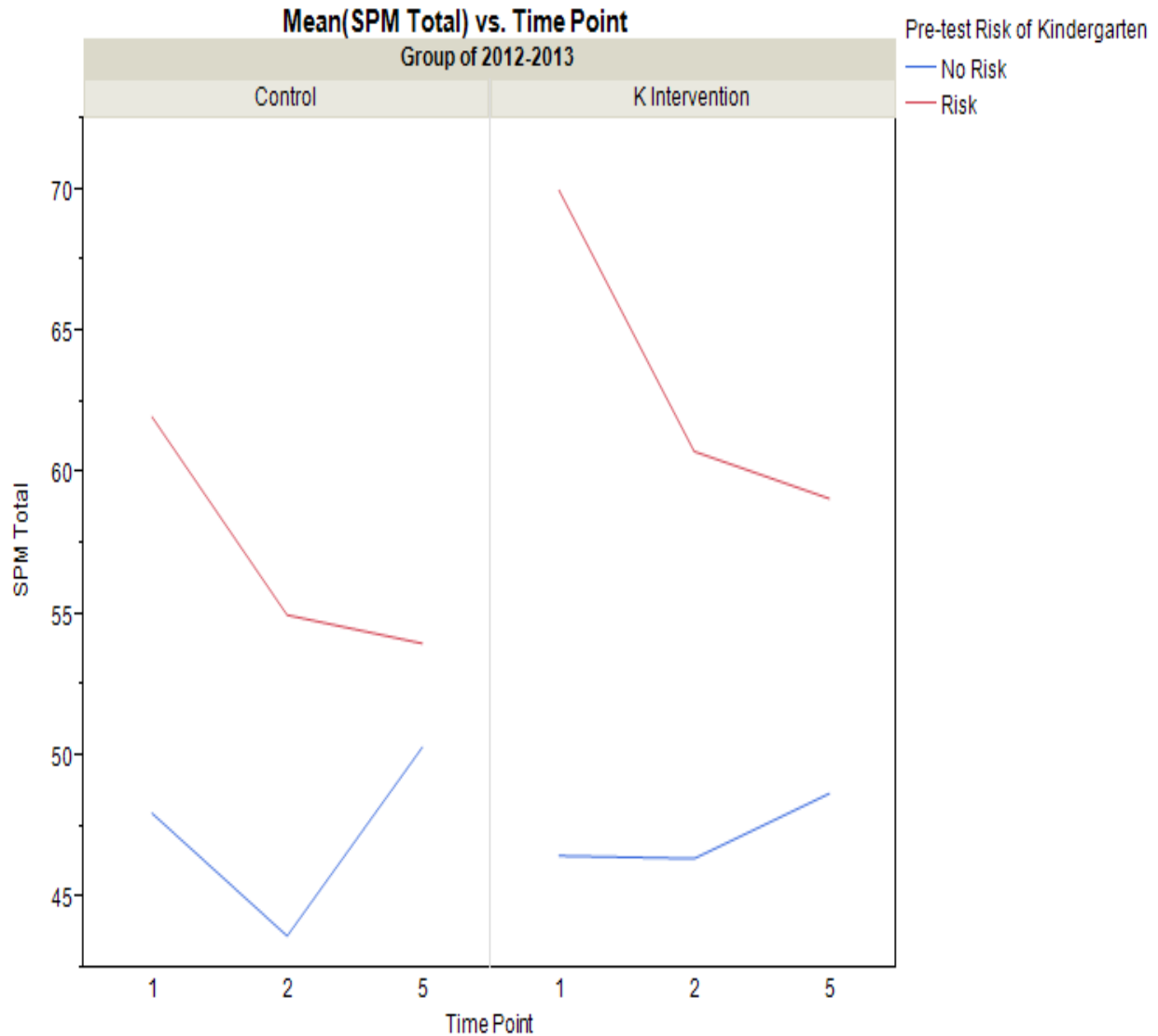


Figure 4.14. Graph highlighting the change in mean scores over time for the students that were in the 2010-2011 control group and intervention group and are currently in second grade. Time-point 1 is kindergarten pretest, time-point 2 is kindergarten posttest, and time-point 5 is second grade pretest. The difference between the “at-risk” group and the “not-at-risk” group over time is also displayed.

CHAPTER 5: DISCUSSION

Part I: Follow-Up Alert Programming

When comparing the results of the intervention between the classes there were differences present. The cell plot comparing all second grade classes and the control group showed the largest differences in Class D, which was one of the second grade classes (Figure 4.2). Also, when comparing students that increased or decreased their cut-off score following intervention, Class D was the only class with any students that increased their cut-off score. This observation might suggest that the belief on the part of the teacher regarding the effectiveness or need for the program in their classroom might impact the effectiveness of the program. Also, for many of the students that did not qualify for the Follow-Up Alert Programming, the teachers scored these students with perfect scores for the pretest and posttest on both metrics. Therefore, these students had no opportunity to increase their score following pretest. This difference in the classes may be due to a difference in the way the teachers viewed the questions on the assessments or an increased need by the researchers to educate the teachers on the scoring for each assessment.

The bar graphs (Figure 4.3) and table (Table 4.2) generated to compare the change in cut-off scores for each measure revealed some interesting trends. Results showed there was a significant change in five subtests, three SFA subtests, and two SPM-C subtests, demonstrating the AP has positive effects that can be measured by two independent metrics. For SFA, significant changes were seen in the areas of Memory and Understanding, Compliance with Adult Directives, and Safety. For SPM-C, significant changes were seen in the areas of Body Awareness and Balance and Motion. The analysis was only able to show there was a change, but not specifically what changed. However, qualitatively, trends showed there were a higher

percentage of students in the experimental group that had an increase in cut-off score than students who did not receive the Follow-Up Alert Programming. The relatively greater improvements in the experimental group were seen in the subtests of Memory and Understanding, Compliance with Adult Directives, Safety, and Balance and Motion. Together, these data suggest the AP had positive effects not only on the sensory abilities of students, but also on their ability to perform academically. In fact, Balance and Motion was the only measure that showed a significant change of the subtests that were used for qualification for the follow-up programming. This may indicate that more acute changes are seen in academic performance following Alert Programming than specifically the underlying sensory abilities.

In the area of Body Awareness, more students in the experimental group had a decrease in cut-off scores than students in the control group. In this section, the questions prompt the teacher to assess the force a student uses for writing, grasping objects, petting animals, the student's drive to jump, push, or pull, and bumping or pushing other students. This decrease in score may show these skills are difficult for children to acquire, and increased attention may need to be focused in this area. Also, the area of Body Awareness may be affected by the AP, but it is not a focal point of the Program. The decrease in score may highlight that other strategies may need to be used in conjunction with the AP to increase student's skills in this area.

Part II: Durability of Kindergarten Alert Programming

The SPM-C subtest of Touch shows interesting trends over the three time-points. For both of the intervention groups and the "not-at-risk" control group, a trend of increasing score, which indicates decreased functioning, is seen from kindergarten pretest to kindergarten posttest. The score of the "not-at-risk" control group continues to trend upward from kindergarten posttest to second grade pretest. However, the scores for both of the intervention groups trend to not only

return to their original score, but be lower than their original score, which indicates better functioning. This may indicate that most students have difficulties in the area of Touch during the kindergarten year, but these difficulties may decrease with physical maturation. However, the students that had kindergarten Alert Programming tended to have better functioning at the beginning of the second grade year, suggesting that AP assisted students to have better functioning in the area of Touch following additional physical maturation.

The subtest of Planning and Ideas showed much variability for all students at all three time-points in all four groups (Figure 4.12). The variability further highlights the need for the teachers and occupational therapists/researchers to be in agreement on the need for, and the benefit that, the AP can provide to all students in the classroom, particularly those students that are at-risk for self-regulation difficulties. In addition, these data suggest the need for all teachers to be well instructed on scoring the metrics each time the assessment is completed. The test-retest reliability, and the accuracy of evaluating student change over time likely would be improved.

The responses and variability of changes in scores from kindergarten to second grade were different for all four groups, including the “at-risk” control and intervention groups and the “not-at-risk” control and intervention groups for all subtests. However, there were trends in each group that highlight how each group responded. In several subtests, (Compliance with Adult Directives, Memory and Understanding, Vision, Balance and Motion, and Planning and Ideas), even though there was an increase in student functioning from kindergarten pretest to kindergarten posttest, by second grade pretest scores trended back to baseline scores at kindergarten pretest (Figures 4.4, 4.5, 4.7, 4.11, and 4.12). These patterns might indicate that the effects of a general Alert Programming strategy in the kindergarten year may not be durable to

the second grade year, at least for those students at some level of risk. However, there was an increase in functioning during the period of time that the AP was implemented, indicating that the AP would be beneficial for students every year. If the AP was implemented yearly, students may continue to build upon the skills they gained as opposed to returning to their baseline performance and abilities.

Analysis of the SPM-C Total Score showed that there were some significant differences between groups (Figure 4.14). There was a significant difference found between the responses of the “at-risk” groups and the “not-at-risk” groups indicating that the AP may be more beneficial for students that are identified with self-regulation difficulties than students who already have the skills needed to regulate their behavior. Also, there was a significant difference between the time-points for the groups. There was a difference in the group scores over time, indicating that Alert Programming yearly would be advantageous to prevent a trend of decreased functioning in at risk groups.

Ethical Concern/ Limitations

Throughout the current study measures were taken to prevent ethical concerns. An ethical concern could be that the children or their parents may have felt coerced to participate in the study, believing they or their children might be punished or treated differently by not participating. It was explained in the parent permission form, to the teachers, and throughout the study that participation was voluntary and no repercussion would come from choosing not to participate. The parents of the students acknowledged that they had full understanding of the study’s intentions and procedures by signing a parental permission form prior to the beginning of the study. Also, all data and student information was kept confidential by using cover sheets for

all student recording sheets, keeping information in locked computers and file cabinets, and using coding for all student identifiers.

There were a few limitations in the current study. One limitation of this study was the researcher had little experience conducting research. To minimize this limitation, this researcher worked closely with a more experienced faculty advisor to develop the research study, evaluate the study as it was being completed, and to assess the results. A second limitation was that the students in the experimental group for this study included only children from an independent school, likely skewing the sample to mostly represent children of higher socioeconomic status, and therefore, limit the ability to generalize the study to many public school settings. A third limitation was that this study used a convenience sample for both schools and all students in the study, causing the study to have decreased randomization, less control over who was included in the sample, and less generalizability. Lastly, a limitation was that, although the teachers were provided with instruction for completing the pretest and posttest assessments, the researchers did not provide in-person, detailed instruction for each subtest of the two assessments. This could have caused the teachers to score the assessments differently and decrease test-retest reliability.

Implications for Occupational Therapists and Teachers

The occupation of attending school is a large and vital aspect of children's lives. It is in the occupation of going to school that children learn important educational information, to adapt to differing sensory environments, transition from one activity to another, and interact with peers and teachers in differing environments and activities. An inability to change his or her level of alertness can cause students to be delayed in many of these skills and in retaining information needed for further education. Further, studies (Conner, et. al, 2010; Liew, McTigue, Barrois, & Hughes, 2008; Skibbe, et al., 2012) have shown that students' own self-regulation and the self-

regulation of their peers has an impact on their academic success in their current grade and in their future performance. This research study and others (Barnes, et. al., 2003; Olson & Moulton, 2004; Schilling & Schwartz, 2004; Zeidler, 2012) have shown that sensory processing and sensory integration activities and programs, such as the AP, is beneficial for students to change their level of alertness and subsequently increase their effectiveness in fully participating in the school environment and increase their academic success. Therefore, it is important for teachers and occupational therapist working in the school system to collaboratively implement the AP or sensory processing strategies into the classroom for students with weak self-regulation to not only increase their success in school, but also enhance the learning of all students in the classroom.

The current research study highlighted differences in the effectiveness of the AP depending on the classroom in which it was implemented. The most gain was made in classrooms where the teacher fully understood and embraced the AP and its effectiveness. This highlights the importance that teachers and occupational therapists must complete the AP, and programs like it, with a common understanding of the effectiveness and necessity of the program for the students. The students likely will obtain better results and increased ability to alter their level of alertness when a team approach is used.

Recommendations for Future Research

The occupation of attending school is imperative in the life children because it is during this occupation that they learn educational material, make connections with peers, and learn to regulate their behavior. It is necessary for all professionals involved with children in the school system to implement strategies, programs, and activities that are proven to be effective to help students be successful in all areas of this occupation. Currently, there is evidence showing that

the AP is effective in teaching students to identify their arousal level and give them strategies to regulate their behavior. However, more research is required in this area because the evidence that is available is limited.

A replication of the current study would be beneficial in the future. This would provide the researcher with data on the same group of children for kindergarten, first, and second grade. Comparisons would be easier to construct because the children could be compared to themselves at three different time points, rather than attempting to compare two different groups of children. Also, if the study was completed again, the comparisons originally intended by the current researcher could be analyzed. These comparisons include assessing the difference in sensory processing and school functioning skills from pretest to posttest after follow-up Alert Programming in students that had programming in kindergarten and those with no previous experience. A second comparison that could be analyzed is the difference in pretest and posttest change between first grade students and second grade students with follow-up Alert Programming. These comparisons would analyze whether students with previous experience with the AP responded differently to follow-up programming than those with no previous experience and if students in one grade responded differently than the other grade to follow-up Alert Programming.

In the past, most studies of the AP have included a control group and an experimental group. Future research would benefit from completing a study with a cross-over design. In this design all students that needed programming could receive it with only half receiving programming the first eight weeks and the other half receiving programming the second eight weeks. This would allow the researchers to compare the groups following the first eight weeks to further assess the effectiveness of the AP.

One of the challenges for several studies focused on the AP is a small sample size limiting statistical power. In the future, research would benefit from including a larger sample size to increase statistical power and be able to small changes created by the AP. However, more students at any grade level likely means more teachers as well, and added effort would be required or the increased variability by differences in teacher scoring might offset any gain in power form increased numbers. Further, observing in the classrooms prior to completion of the pretest would be beneficial for the researchers to understand the classroom dynamics, build relationships with the teachers, and understand the needs of each student. Lastly, completing sample assessments with the teachers for select students following observation and prior to completion of the pretest would increase teacher understanding of the tools and allow them to ask questions if needed, increasing the validity and reliability of the assessment results.

Conclusion

As stated previously, the purpose of this study was two-fold. To determine whether participation in previous Alert Programming as kindergarteners produced lasting effects in either 1) the ability of students previously identified with challenges in the kindergarten year to respond to additional intervention, or 2) in the current functioning status of the students. This was assessed by analyzing the SPM-C and SFA scores of “at-risk” students at the Oakwood School, “not-at-risk” students at the Oakwood School, and a control group of second grade students at Williamston Primary School that participated in the 2010-2011 research study, following a six or eight week Follow-Up Alert Program. Results suggested the Follow-Up Alert Programming was beneficial for second grade students as measured by two different metrics. Also, results showed there may have been a difference in the scoring of the metrics by the different primary classroom teachers. This variance pointed to the importance of the AP to be

implemented as a combined effort of teachers and researchers, both embracing the need for and benefit of the program in the classroom.

Also, the durability of the kindergarten programming was assessed by evaluating the trends of change over three time-points, including kindergarten pretest, kindergarten posttest, and second grade pretest. Results showed that there was a change in scores over time and that the change was different between the “at-risk” and “not-at-risk” groups. However, it was observed that for several subtests on two different metrics the scores from kindergarten pretest to kindergarten posttest tended to show improvement in students’ functioning and then tended to show a return towards the original kindergarten pretest scores by second grade pretest. This points to the effects of the AP during the kindergarten year not being durable to the second grade year. Also, it highlights that implementing the AP yearly would be advantageous to prevent a loss of the skills obtained during original Alert Programming.

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Appendix A:

Sensory Processing Measure- Main Classroom Form



Main Classroom Form

Profile Sheet

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Name (or ID#): _____ Age: _____ Grade: _____ Gender: M F

Date this form completed: _____ School: _____ Teacher: _____

Reason for assessment: _____

%ile	T	SOC	VIS	HEA	TOU	BOD	BAL	PLA	TOT	T	%ile
80		39-40	26-28	24-28	25-32	25-28	34-36	40	130-168	80	
79			25		23-24	23-24	33	39	119-129	79	
78		38	24	22-23	21-22		31-32	38	117-118	78	
77		37	22-23	21		22			115-116	77	
76		36	20-21	19-20	20		30	37	109-114	76	
75			19	18	19	21	28-29	36	108	75	
>99	74	35		17			27	34-35	99-107	74	>99
99	73	34	18		18		26	32-33	96-98	73	99
72		33	17	16	17	20	24-25	30-31	94-95	72	
98	71						23	29	88-93	71	98
70		32	16		16	19	22	28	87	70	
97	69	31		15		18	21		84-86	69	97
96	68	30			15	17		27	82-83	68	96
67			15	14	14	16	20	26	80-81	67	
95	66	29				15	19	25	78-79	66	95
93	65	28	14	13	13	14			74-77	65	93
92	64	27	13				18	24	71-73	64	92
90	63	26		12	12	13	17	23	69-70	63	90
88	62	25	12					21-22	67-68	62	88
86	61	24		11	11	12	16	20	64-66	61	86
84	60	23					15	19	62-63	60	84
82	59	22	11	10		11		18	60-61	59	82
79	58				10		14	17	58-59	58	79
76	57	21	10			10		16	56-57	57	76
73	56	20		9			13		55	56	73
69	55							15	53-54	55	69
66	54	19				9		14	52	54	66
62	53	18	9		9		12		51	53	62
58	52	17		8				13	50	52	58
54	51					8	11		49	51	54
50	50	16						12	48	50	50
46	49	15							47	49	46
42	48		8							48	42
38	47	14					10	11	46	47	38
34	46									46	34
31	45	13							45	45	31
27	44	12			8					44	27
24	43			7					44	43	24
21	42					7				42	21
18	41	11								41	18
16	40	10	7				9	10	42-43	40	16

EXAMINER: REMOVE THIS SHEET BEFORE COMPLETING FORM.

%ile	T	SOC	VIS	HEA	TOU	BOD	BAL	PLA	TOT	T	%ile	
Raw Score ▶		_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	◀ Raw Score
T-Score ▶		_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	◀ T-Score
Interpretive Range												
Typical (407-597) <input type="checkbox"/>												
Some Problems (607-697) <input type="checkbox"/>												
Definite Dysfunction (707-807) <input type="checkbox"/>												

Scores from SPM School Environments Form

	ART	MUS	PHY	REC	CAF	BUS
Cutoff value:	29	29	28	29	27	19
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Check box if score is greater than or equal to cutoff value. Check indicates that student displays more problems than is typical in that environment.

Appendix B:

School Function Assessment: Part III Activity Performance - Cognitive/Behavioral Tasks

**PART III Activity Performance
Cognitive/Behavioral Tasks**

Functional Communication		Memory and Understanding	
<p>Consider any established mode of communication (e.g., verbal, sign, computer, writing, communication board). Ratings should be based on interpretability by others who are knowledgeable of the mode used.</p>			
<ol style="list-style-type: none"> 1. Communicates yes/no, acceptance/refusal, or choice between 2 or more items. 2. Communicates "hungry" or "thirsty." 3. Communicates "sick," "hurt," or "help." 4. Communicates need for help with a functional (nonacademic) task (e.g., toileting, opening a container). 5. Communicates first and last name. 6. Communicates where something is located in classroom or school. 7. Communicates short messages to another person. 8. Communicates inquiries/requests for information. 9. Communicates short messages from one person to another (e.g., teacher to principal). 10. Communicates basic safety information. 11. Describes an object well enough to enable correct identification. 12. Communicates where he/she would go or what he/she would do if lost (e.g., on school trips). 13. Communicates complex (3 step) directions to others. 	<ol style="list-style-type: none"> 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 	<ol style="list-style-type: none"> 1. Demonstrates understanding of basic one-step directions or instructions (e.g., come here, stop, go ahead, get book). 2. Demonstrates memory for use of tools and materials as taught (e.g., classroom tools, adapted equipment, specialized items). 3. Demonstrates memory of routines/structures from day to day. 4. Demonstrates memory for where materials belong. 5. Demonstrates memory for directions to/from other areas in/around the school (e.g., does not get lost). 6. Demonstrates understanding of instructions/directions involving prepositions or spatial concepts (e.g., in the box, under the chair). 7. Demonstrates understanding of two-step directions or instructions. 8. Demonstrates memory of game/activity rules (e.g., board games). 9. Demonstrates understanding of (follows) directions/instructions involving conditional, temporal or sequential concepts (e.g., if/then, after, later, first/second). 10. Demonstrates ability to follow a series of three or more related instructions (e.g., put things away, get your coat, and line up). 	<ol style="list-style-type: none"> 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
<p>Respondent's Initials</p>	<p>Functional Communication Raw Score</p>	<p>Respondent's Initials</p>	<p>Memory and Understanding Raw Score</p>

Reminder: Refer to the *Rating Scale Guide* for rating definitions and examples.

PART III Activity Performance Cognitive/Behavioral Tasks (continued)

Following Social Conventions

1. Eats only own food and drink unless has permission of others.	1	2	3	4
2. Displays appropriate behavior regarding issues of sexuality (e.g., refrains from explicit sexual talk/acts, private body parts display). . .	1	2	3	4
3. Smiles, nods or says "you're welcome" when told "thank you."	1	2	3	4
4. Maintains appropriate social/physical boundaries by keeping hands to self, sitting/standing at appropriate distance.	1	2	3	4
5. Uses good manners, including saying "please," "thank you," and "sorry" when appropriate.	1	2	3	4
6. Obtains items that are out of reach appropriately (e.g., asks/points rather than reaching over).	1	2	3	4
7. Observes social conventions regarding appropriate topics and language (e.g., unappetizing topics while eating; bathroom talk).	1	2	3	4
8. Asks permission in contexts where it is expected (e.g., leaving the room, using some one else's possessions).	1	2	3	4
9. Respects others' privacy.	1	2	3	4
10. Apologizes for unintentional mistakes (e.g., bumping into another person).	1	2	3	4
11. Demonstrates recognition of how and when to communicate about private matters (e.g., toileting accident).	1	2	3	4
12. Observes social conventions regarding asking questions or making statements that are embarrassing or hurtful of others.	1	2	3	4
Respondent's Initials	Following Social Conventions Raw Score			

Compliance With Adult Directives and School Rules

1. Proceeds as directed when told "yes" or "begin."	1	2	3	4
2. Cooperates with non-routine commands and directions given by teacher or other responsible adult.	1	2	3	4
3. Cooperates when asked to help with cleanup and other classroom chores.	1	2	3	4
4. Observes rules regarding allowed versus restricted objects in classroom.	1	2	3	4
5. Observes rules concerning allowed versus off-limits or restricted areas.	1	2	3	4
6. Stops activity immediately when told to do so.	1	2	3	4
7. Observes rules governing movement around the classroom (e.g., lining up, changing seat).	1	2	3	4
8. Shows care in use and handling of others' property.	1	2	3	4
9. Observes rules governing bathroom use (e.g., using appropriate amount of toilet paper, disposing of waste appropriately).	1	2	3	4
10. Observes rules governing movement around the school (e.g., running, walking in line).	1	2	3	4
11. Observes rules regarding talking.	1	2	3	4
12. Cleans assigned area and puts things away at appropriate time.	1	2	3	4
13. Follows time limits set by adult.	1	2	3	4
14. Raises hand (or makes some other gesture) before asking a question or answering.	1	2	3	4
15. Keeps belongings organized in assigned space.	1	2	3	4
Respondent's Initials	Compliance With Adult Directives and School Rules Raw Score			

Ratings Key for Activity Performance

1: Does not perform 2: Partial performance 3: Inconsistent performance 4: Consistent performance

PART III Activity Performance Cognitive/Behavioral Tasks (continued)

Task Behavior/Completion		Positive Interaction	
1. Listens/attends for at least five minutes.	1 2 3 4	1. Responds appropriately to social interaction by adult.	1 2 3 4
2. Remains in designated play or work area without supervision for a specified time.	1 2 3 4	2. Responds appropriately to social interaction by peer.	1 2 3 4
3. Attends quietly to/stays focused on audio or visual presentation for at least 20 minutes.	1 2 3 4	3. Waits for turn in group activities.	1 2 3 4
4. Attends to directions/instructions given to a small group of students.	1 2 3 4	4. Works/plays in a group without disrupting the play or work of others.	1 2 3 4
5. Attends to a story or teacher-directed lesson for more than 15 minutes.	1 2 3 4	5. Demonstrates independence in social participation (i.e., does not cling to others).	1 2 3 4
6. Stays on task at own work or play for at least 15 minutes.	1 2 3 4	6. Listens/pays attention while others in group are speaking.	1 2 3 4
7. Listens/attends to an entire class activity, presentation, or lecture.	1 2 3 4	7. Shares materials without being reminded.	1 2 3 4
8. Maintains an acceptable level of performance while not working near others.	1 2 3 4	8. Asks permission to use objects or materials being used by another.	1 2 3 4
9. Makes some attempt to modify performance based on teacher's suggestions or constructive feedback.	1 2 3 4	9. Waits turn to speak.	1 2 3 4
10. Recovers after failure (i.e., does not give up or lose temper).	1 2 3 4	10. Initiates conversations appropriately.	1 2 3 4
11. Initiates work promptly after receiving directions.	1 2 3 4	11. Sustains conversations through several exchanges.	1 2 3 4
12. Identifies materials needed for a particular task.	1 2 3 4	12. Offers to help another person.	1 2 3 4
13. Lets teacher know when task information or specific assistance is needed.	1 2 3 4	13. Modulates volume and tone of voice to suit context.	1 2 3 4
14. Finishes project that takes several days.	1 2 3 4	14. Makes positive comments to peers (e.g., on successful performance).	1 2 3 4
15. Asks for help when rules or directions are not clear.	1 2 3 4	15. Ends conversations appropriately.	1 2 3 4
16. Attempts to solve a problem on own before asking for help.	1 2 3 4	16. Negotiates joining an ongoing play or activity group.	1 2 3 4
17. Works productively on own work, even while seated in close proximity to others (i.e., ignores distractions).	1 2 3 4	17. Works cooperatively with other students on all aspects of a multiple step, goal-directed activity.	1 2 3 4
18. Makes appropriate modifications to task or materials to meet his/her needs (e.g., rearranges desktop to make more space; changes to more functional position; finds a different writing implement).	1 2 3 4	18. Initiates topics of interest to others.	1 2 3 4
19. Has good independent work habits and makes efficient use of class time.	1 2 3 4	19. Listens to others and contributes own views.	1 2 3 4
		20. Negotiates simple plans/decisions and compromises with others.	1 2 3 4
Respondent's Initials	Task Behavior/Completion Raw Score	Positive Interaction Raw Score	

Reminder: Refer to the *Rating Scale Guide* for rating definitions and examples.

PART III Activity Performance Cognitive/Behavioral Tasks (continued)

Behavior Regulation

1. Displays appropriate restraint regarding self-stimulation (e.g., refrains from head banging, hand flapping).	1 2 3 4
2. Accepts unexpected changes in routine.	1 2 3 4
3. Refrains from provoking others.	1 2 3 4
4. Uses nonaggressive words and actions.	1 2 3 4
5. Maintains behavioral control in large groups of students (e.g., cafeteria, assemblies).	1 2 3 4
6. Hears constructive criticism without losing temper.	1 2 3 4
7. Uses words rather than physical actions to respond when provoked or angry at others.	1 2 3 4
8. Seeks adult assistance, if necessary, when experiencing peer conflict, especially conflicts involving violence.	1 2 3 4
9. Responds to/handles teasing in a constructive way.	1 2 3 4
10. Handles frustration when experiencing difficulties with school tasks/activities.	1 2 3 4
11. Shows common sense in words and actions around bullies, gangs, or strangers.	1 2 3 4
12. Resolves ordinary peer conflicts or problems adequately on his/her own without requesting teacher assistance.	1 2 3 4

Respondent's Initials	Behavior Regulation Raw Score	
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Safety

1. Keeps unsafe objects out of mouth.	1 2 3 4
2. Reports illness/injury to an adult.	1 2 3 4
3. Demonstrates caution around electrical outlets, light sockets, and equipment.	1 2 3 4
4. Demonstrates appropriate caution in situations where falling is possible (e.g., stairs, climbing on play equipment, tipping in chairs).	1 2 3 4
5. Demonstrates appropriate caution around hot things, including regulating water temperature.	1 2 3 4
6. Recognizes dangerous areas and situations and adjusts behavior accordingly (e.g., broken glass).	1 2 3 4
7. Responds to emergency signal by initiating established routine.	1 2 3 4
8. Identifies an accident or emergency situation and reports it to a teacher or adult.	1 2 3 4
9. Demonstrates some wariness around unknown individuals who have not been designated as "visitors" by a responsible adult (e.g., seems to understand potential harm).	1 2 3 4
10. Checks for safety before crossing a traffic area, even when accompanied by another person (e.g., looks/listens before moving into road).	1 2 3 4

Respondent's Initials	Safety Raw Score	
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Personal Care Awareness

- Rate items based on demonstrated awareness that action is needed.
- If student is physically unable to perform activity, rate "1," unless he/she initiates asking others to perform the needed action, in which case rate "2."

1. Wipes face/chin when needed.	1 2 3 4
2. Washes and dries hands after toileting.	1 2 3 4
3. Re-dresses self before exiting bathroom or stall.	1 2 3 4
4. Selects appropriate sex bathroom; checks to see if bathroom/stall is occupied before entering.	1 2 3 4
5. Blows/wipes nose.	1 2 3 4
6. Closes the bathroom/stall door for privacy.	1 2 3 4
7. Wipes self after toileting.	1 2 3 4
8. Rearranges clothing as needed (e.g., insures that pants zipper is up, skirt is down).	1 2 3 4
9. Covers mouth and nose with hand or tissue when coughing or sneezing.	1 2 3 4
10. Brushes, combs, or rearranges hair as needed.	1 2 3 4

Respondent's Initials	Personal Care Awareness Raw Score	
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Ratings Key for Activity Performance

1: Does not perform **2:** Partial performance **3:** Inconsistent performance **4:** Consistent performance

Appendix C:

Second Grade Alert Activities Week 1 and 2

Bean Bag Toss: Toss weighted bean bags into a bucket approximately ten feet away

Scooting on a tray: Sit on a plastic tray and use your feet to push you forward or backward from one wall to another.

Wall push-ups: Complete 15 wall push-ups

Yogarilla Cards: Complete 3 Yogarilla cards, which provides an example of a yoga pose, and hold for 10 seconds

Rolling a Die: Roll a die and complete the activity assigned to that number. The activity assigned to each number is listed below:

1. 15 Jumping Jacks
2. 15 Wall Push-Ups
3. Crawling for 15 seconds
4. Scooting 15 times: Sit on a plastic tray and use your feet to push you forward or backward 15 times.
5. Jumping on one leg ten times each leg
6. 15 Mountain Climbers

Appendix D:

Second Grade Alert Activities Week 3 and 4

Rolling pin: Hold rolling pin in both hands with knees on the ground. Roll the rolling pin away from you and then back towards you with your knees remaining in the same place five times. Complete the task on a mat for safety.

Scooting on a tray: Sit on a plastic tray and use your feet to push you forward or backward from one wall to another.

Wall push-ups: Complete 15 wall push-ups

Yogarilla Cards: Complete 3 Yogarilla cards, which provides an example of a yoga pose, and hold for 10 seconds

Rolling a Die: Roll a die and complete the activity assigned to that number. The activity assigned to each number is listed below:

1. 15 Jumping Jacks
2. 15 Wall Push-Ups
3. Crawling for 15 seconds
4. Scooting 15 times: Sit on a plastic tray and use your feet to push you forward or backward 15 times.
5. Jumping on one leg ten times each leg
6. 15 Mountain Climbers

Appendix E:

Second Grade Alert Activities Week 5 and 6

Rolling pin: Hold rolling pin in both hands with knees on the ground. Roll the rolling pin away from you and then back towards you with your knees remaining in the same place five times. Complete the task on a mat for safety.

Crab Walk: Complete a crab walk to one wall and back while balancing a weighted bean bag on your chest

Wall push-ups: Complete 15 wall push-ups

Yogarilla Cards: Complete 3 Yogarilla cards, which provides an example of a yoga pose, and hold for 10 seconds

Rolling a Die: Roll a die and complete the activity assigned to that number. The activity assigned to each number is listed below:

1. 15 Jumping Jacks
2. Wall Push: Stand near the wall with your feet slightly apart and push against the wall for 15 seconds
3. 1 Yogarilla Card
4. 5 Push-Aways: Lie close to the wall with your back on a plastic tray and your knees bent with your feet against the wall. Push with your legs to propel yourself away from the wall.
5. Jumping on one leg ten times each leg
6. 15 Mountain Climbers

Jumping: Jump 20 times on a half-ball while holding the railing

Appendix F:

Second Grade Alert Activities Week 5 and 6

Rolling pin: Hold rolling pin in both hands with knees on the ground. Roll the rolling pin away from you and then back towards you with your knees remaining in the same place five times. Complete the task on a mat for safety.

Crab Walk: Complete a crab walk to one wall and back while balancing a weighted bean bag on your chest

Wall push-ups: Complete 15 wall push-ups

Yogarilla Cards: Complete 3 Yogarilla cards, which provides an example of a yoga pose, and hold for 10 seconds

Rolling a Die: Roll a die and complete the activity assigned to that number. The activity assigned to each number is listed below:

1. 15 Jumping Jacks
2. Wall Push: Stand near the wall with your feet slightly apart and push against the wall for 15 seconds
3. 1 Yogarilla Card
4. 5 Push-Aways: Lie close to the wall with your back on a plastic tray and your knees bent with your feet against the wall. Push with your legs to propel yourself away from the wall.
5. Jumping on one leg ten times each leg
6. 15 Mountain Climbers

Jumping: Jump 20 times on a half-ball while holding the railing

Appendix G:

First Grade Alert Activities Week 1 through 6

Jumping on a half ball: Jump 20 times on a half ball

Jumping Jacks: Complete 10 jumping jacks

Wall Push: Stand near the wall with feet slightly apart and push against the wall for 10 seconds

Yogarilla Card: Complete 1 Yogarilla card, which provides an example of a yoga pose, and hold for 5 seconds

Therapist's/Teacher's Choice: Therapist or teacher chooses one of the four activities

Appendix H:

Oakwood School Principal's Letter and Parental Consent Form

Date:

Dear First and Second Grade Parents,

Students attending First or Second grade at the Oakwood have been invited to participate in a follow-up study with East Carolina University's Department of Occupational Therapy using the Alert Program for Self-Regulation. For 8 weeks starting _____ your child will have an opportunity to participate in daily activities that can be carried out **independently** based on the Alert Program. Individualized sensory activities will be made available first thing in the morning, at recess and at lunch time. Whole class 15 seconds, transition activities will be lead by the classroom teacher between subjects.

The Alert Program is an easy-to teach practical program that was developed by two occupational therapists to teach children to recognize their attention level or what will be referred to as an engine level for learning. A wide range of simple, low-budget strategies and activities that are sensorimotor based will be made available to your child. With the help of the classroom teachers and Dr. Lust your child will determine which sensory strategies/activities he or she likes and will be most helpful in getting their "engine in "gear" for learning. There will be adult supervision at all times. If your child does not wish to do an Alert strategy or activity at any time, his or her wishes will be respected.

We ask your permission for the **classroom teacher** to complete two assessments on your child at the beginning and the end of the 8 week program. Your child's sensory abilities will be assessed using the Sensory Processing Measure- Main Classroom form and your child's performance in cognitive and behavioral tasks will be determined using the School Functional Assessment -Part III.

I am excited that Dr. Lust and her graduate occupational therapy student(s) will be providing sensory based activities and strategies to our students. The Alert program will not disrupt our regular day and I believe the students will enjoy and benefit from this opportunity.

Please complete the attached permission form and return it to school by _____. If you have any questions, please feel free to contact Dr. Lust at W# 252-744-6193 or H# 252-756-3939.

Warm Regards,

Robert R. Peterson

Head of School

_____ **Yes,** my child _____ Birth date: _____

may participate in the 8 week, Alert Program – for Self-Regulation program being made available at the Oakwood School. I also give my permission for the **classroom teachers** to complete the Sensory Processing Measure – Main Classroom Form, and the School Functional Assessment – the Cognitive/Behavioral Task section at the beginning and the end of the 8 week program.

_____ **No,** my child _____

May not participate in the 8 week, Alert Program – for Self-Regulation being made available at the Oakwood School. **I do not** give my permission for the classroom teachers to complete the Sensory Processing Measure – Main Classroom Form, and the School Functional Assessment – the Cognitive/Behavioral Task section at the beginning and the end of the 8 week program.

Parent signature: _____

Date: _____

Appendix I:

Williamston Primary Principal's Letter and Parental Consent Form

**Principal's Letter of Support
Control Group**

I support the follow-up research study being conducted by Dr. Carol A. Lust on past kindergarten students who were in Mrs. Lammert's class in 2010-2011. The study will compare 3 second grade classroom's levels of alertness for learning after 2 second grades classes receive developmentally appropriate sensorimotor strategies from the Alert Program for Self-Regulation using the Response to Intervention (RtI) model.

I understand that two rating scales for the second grade classroom teacher(s)/teacher assistant(s), will be filled out at the beginning of the study (January) and end of the study (March). The *Sensory Process Measure (SPM)* will be used to assess students' abilities to self-regulate alertness for learning (sensorimotor /sensory processing) and the *School Functional Assessment - Part III* (cognitive/behavioral tasks section only) will be used to look at students' learning.

I understand that the past kindergarten students who were in Mrs. Lammert's classroom and are now in second grade at my school will represent the control group and 2 outside second grade classrooms of a similar developmental level will be the experimental group. I understand that if any questions come up with regards to this research project I may contact the principle investigator, Dr. Carol A. Lust at phone number W# (252) 744-6193 or H# (252)-756-3939.

I certify that I have read all of the above, asked questions and received answers concerning areas I did not understand, and have received satisfactory answers to these questions. As principals of this school I give my consent for this follow-up research study titled "Implementing the Alert Program For Self-Regulation Through the Response to Intervention Model with Selected At Risk Children: Collaborating with Elementary Education Teacher To Identify Effective Strategies for Improving Students' Readiness to Learn" between East Carolina University and Williamston Primary School, Williamston, NC.

Principal's Name (print)

Date

_____Signature of Principal

TO: Williamston Primary School – 2nd Grade Parents/Guardian who child was in Mrs. Lammert’s Kindergarten Class.

FROM: Serena Paschal – Principal
Williamston Primary School

Carol A. Lust Ed.D., OTR/L
East Carolina University –Principal Research Investigator

SENT: January _____, 2013

RE: Parent permission for your child’s teacher to complete two rating scales about your child in January 2013 and again in March 2013.

East Carolina University’s Department of Occupational Therapy would like to receive your permission for your child to be included in a follow up research study. Your child’s 2nd grade teacher will fill out the Sensory Processing Measure – Main Classroom Form which looks at a child’s sensory abilities in the classroom and also fill out the School Functional Assessment which looks at your child’s performance in learning. The two rating scales will be filled out in late January (pretest) and then again in March (posttest). All data will be kept confidential and locked in a file drawer in the Principal Investigator’s office with limited outside access. At the conclusion of the study, data findings will be shared with our school

As principal of Williamston Primary School I have approved this follow-up study and I hope you will support it too.

Please complete the permission form on the next page and return it to school as soon as possible, no later than _____. If you have questions, please feel free to call the principle investigator, Dr. Carol Lust at W# 252-744-6193 or H# 252-756-3939 or speak with Ms. Serena Pascal at (252) 792-3253

_____ **Yes,**

I **support** this follow-up research project and agree to let my child participate in this follow-up study. I give my permission for the classroom teacher to complete the Sensory Processing Measure – Main Classroom Form and the School Functional Assessment – Part III on my child _____ (name) in January and then again in March.

_____ **No,**

I **do not support** this follow-up research project and I **do not** agree to let my child participate in this follow-up study. I **do not** give my permission for the classroom teacher to complete the Sensory Processing Measure – Main Classroom Form or the School Functional Assessment –Part III on my child _____(name) in January and then again in March.

Parent/Guardian signature: _____

Date: _____

Appendix J:

List of all Alert Activities for First Grade

Jumping on a half ball: Jump 20 times on a half ball

Jumping Jacks: Complete 10 jumping jacks

Wall Push: Stand near the wall with feet slightly apart and push against the wall for 10 seconds

Yogarilla Card: Complete 1 Yogarilla card, which provides an example of a yoga pose, and hold for 5 seconds

Therapist's/Teacher's Choice: Therapist or teacher chooses one of the four activities

Appendix K:

List of all Alert Activities for Second Grade

Bean Bag Toss: Toss weighted bean bags into a bucket approximately ten feet away

Scooting on a tray: Sit on a plastic tray and use your feet to push you forward or backward from one wall to another.

Wall push-ups: Complete 15 wall push-ups

Yogarilla Cards: Complete 3 Yogarilla cards, which provides an example of a yoga pose, and hold for 10 seconds

Rolling a Die version 1: Roll a die and complete the activity assigned to that number. The activity assigned to each number is listed below:

1. 15 Jumping Jacks
2. 15 Wall Push-Ups
3. Crawling for 15 seconds
4. Scooting 15 times: Sit on a plastic tray and use your feet to push you forward or backward 15 times.
5. Jumping on one leg ten times each leg
6. 15 Mountain Climbers

Rolling pin: Hold rolling pin in both hands with knees on the ground. Roll the rolling pin away from you and then back towards you with your knees remaining in the same place five times. Complete the task on a mat for safety.

Crab Walk: Complete a crab walk to one wall and back while balancing a weighted bean bag on your chest

Rolling a Die version 2: Roll a die and complete the activity assigned to that number. The activity assigned to each number is listed below:

1. 15 Jumping Jacks
2. Wall Push: Stand near the wall with your feet slightly apart and push against the wall for 15 seconds
3. 1 Yogarilla Card
4. 5 Push-Aways: Lie close to the wall with your back on a plastic tray and your knees bent with your feet against the wall. Push with your legs to propel yourself way from the wall.
5. Jumping on one leg ten times each leg
6. 15 Mountain Climbers

Jumping: Jump 20 times on a half-ball while holding the railing

Appendix L:

IRB



EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building · Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office 252-744-2914 · Fax 252-744-2284 · www.ecu.edu/irb

Notification of Amendment Approval

From: Biomedical IRB
To: [Carol Lust](#)
CC:
Date: 5/10/2013
Re: [Ame1 UMCIRB 10-0477](#)
[UMCIRB 10-0477](#)
[IMPORTED] Implementing the Alert Program into a Kindergarten Curriculum Using the Response to Intervention (RtI) Model

Your Amendment has been reviewed and approved using expedited review on 5/10/2013. It was the determination of the UMCIRB Chairperson (or designee) that this revision does not impact the overall risk/benefit ratio of the study and is appropriate for the population and procedures proposed.

Please note that any further changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. A continuing or final review must be submitted to the UMCIRB prior to the date of study expiration. The investigator must adhere to all reporting requirements for this study.






The approval includes the following items:

Name	Description	Modified	Version
parent consent follow up Williamston History	Consent Forms	5/1/2013 11:46 AM	0.02
parent consent Oakwood follow up. History	Consent Forms	3/22/2013 9:46 AM	0.01
Parental letter of consent - experimental qcp History	Consent Forms	3/22/2013 9:39 AM	0.02
Parrot Academy parent consent form. History	Consent Forms	3/22/2013 9:38 AM	0.01
Research Proposal RtI - Alert - Oakwood draft 2.doc History	Study Protocol or Grant Application	3/22/2013 9:26 AM	0.02

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

Appendix M:

Example of Recording Form

<p>Ms. B's Class Week 4</p> <p>Feb. 25-March 1 2013</p>	 <p>Rolling Pin on Mat</p>	 <p>Scooting</p>	 <p>Wall Push-ups</p>	 <p>Yogarilla Cards</p>	 <p>Dice</p>
Monday	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name
Tuesday	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name
Wednesday	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name
Thursday	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name
Friday	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name	Name Name Name Name Name Name Name Name Name