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Interventions Designed to Promote Early Childhood Development

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INTERVENTIONS DESIGNED TO PROMOTE EARLY CHILDHOOD
DEVELOPMENT

BY

Jenna Morhaim

A Directed Research Project

Submitted to the Faculty of
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Abstract

The purpose of this archival study was to evaluate the effects of three interventions designed to enhance various areas of early childhood development of 58 children between the ages of two to five who were enrolled in a local YWCA. The interventions consisted of creative movement/dance lessons for two-year-olds, music exploration for three-year-olds, and yoga classes for four-year-olds. Pre- and posttest measures were obtained for participants at the beginning and ending of the school year utilizing the Mullen Scales of Early Learning (MSEL) in order to obtain a standardized measure of the dependent variables including overall cognitive functioning, visual reception skills, fine motor skills, receptive language abilities, and expressive language abilities. A paired samples t-test was conducted for participants in all age groups as a means for analyzing the results from pre- and post-assessments and determining whether any significant outcomes were demonstrated as a result of intervention implementation. Furthermore, effect sizes were calculated to provide an additional method for examining the impact of the interventions. Results revealed statistically significant gains on the measure of receptive language skills for the three-year-old children who received music lessons. Although no other statistically significant gains were demonstrated for the participants who were provided with any other forms of intervention, small to medium effect sizes were apparent. Specifically, a medium effect size was evident on the measure of fine motor skills for participants in the two-year-old age group who received creative movement/dance lessons. Furthermore, small effect sizes were noted on the measures of overall IQ and expressive language skills for the two-year-old children who received creative movement/dance lessons as well as for the three-year-old children who

participated in music exploration. Small effect sizes were also demonstrated on the measures of visual reception and fine motor skills for the three-year-old children who were enrolled in music lessons as well as on the measure of receptive language for the four-year-old children who received yoga lessons. Implications for practice and future research are discussed.

Early childhood, between the ages of birth to five, is a vital period of rapid change and growth where children acquire the physical, cognitive, emotional, and social skills needed to attain the most optimal development (Park & Peterson, 2003). Extensive literature on early childhood development suggests that during these pivotal years it is imperative to provide children with stimulating and nurturing activities that promote brain development (Gromko & Poorman, 1998; Puckett, Marshall, & Davis, 1999). In fact, early childhood advocates believe that without sufficient stimulation and exposure children have minimal opportunity to experiment, explore and interact with their environment which can, in turn, hinder the likelihood of enhancing overall learning and development (Levinowitz, 1998).

The earliest years in a child's life have been described by some investigators as a critical period during which experiences can influence brain development and the rapid formation of neurons and synaptic processes (Strickland, 2001). Based upon theoretical perspectives, the assumption is that although to some extent brain development is genetically influenced, environmental experiences and interactions during this time are important because of the impact they have on the brain's development for different skills and senses (Schiller, 2003). More specifically, researchers have speculated that neurons and synaptic connections are produced in excess during the initial phase of brain development whereby positive environmental stimulation can strengthen synaptic development, while a lack of reinforcing experiences can lead to an elimination of synaptic processes and neurons (Strickland, 2001; Zillmer & Spiers, 2001). In fact, other researchers have proposed that an increase in the amount of enrichment that is provided to children through interactions and experiences can improve the degree of the

development of neuronal connections required to foster better language, reasoning, and planning skills (Honig, 2002). This has led others to contribute the notion that aside from optimal physical care, child-care programs that provide the most favorable stimulation by means of adult-child engagements, varied playful activities, opportunities for exploration, and a developmentally appropriate learning atmosphere, are better positioned to foster positive contributions towards a child's cognitive development (Campbell, Pungello, Miller-Johnson, Burchinal, & Ramey, 2001). Despite these speculations, there is currently no empirical support demonstrating that these types of stimulating activities can promote brain development in early childhood. For this reason, many early childhood researchers are interested in interventions that can provide a positive and enduring impact on early development as well as the specific outcomes that can result.

In the following sections of this paper, an overview of early childhood interventions designed to enhance development is provided. First, a review of school based interventions is presented followed by a general discussion of early childhood holistic interventions. Next, a more detailed examination of three specific types of holistic interventions is described, 1) dance/creative movement 2) music and 3) yoga.

Early Childhood Intervention

The literature on child development has continuously emphasized the importance of early intervention programs, suggesting that early childhood interventions are an effective means for facilitating optimal development, reducing learning related problems, (Reynolds, Temple, Robertson, & Mann, 2001) and offering enrichment during critical phases of growth (Reynolds, 1994). According to Nelson, Westhues, and MacLeod (2003) preschool prevention programs are intended to enhance a child's abilities and

welfare and/or prevent negative effects. Specifically, the assumption is that changes in a child's early environment can lead to shifts in the course of development (Campbell, Pungello, Miller-Johnson, Burchinal, & Ramey, 2001) where a child's life can be positively impacted by social and educational interventions designed to promote development (Warr-Leeper, 2001).

With regard to this notion, some researchers have suggested that benefits of early interventions can include long-lasting positive effects on cognitive development (Ramey & Landesman-Ramey, 1998), social-emotional functioning, and achievement within and outside of the academic setting (Campbell, Pungello, Miller-Johnson, Burchinal, & Ramey, 2001; Nelson, Westhues, & McLeod, 2003; Warr-Leeper, 2001). Narrative reviews of the literature have suggested that enrichment experiences during early childhood can have positive impacts on brain development, including improving language acquisition, problem-solving skills, and an array of other abilities that are critical throughout life (Park & Peterson, 2003). Furthermore, researchers have shown that early childhood education programs can increase the possibility for children to achieve higher success in the future by decreasing rates of special education placement, (Conyers, Reynolds & Ou, 2003; Reynolds, Temple, Robertson, & Mann, 2001) grade retention (Reynolds, 1994; Reynolds, Temple, Robertson, & Mann, 2001), juvenile delinquency, and high school drop out as well as enhancing the amount of years of school enrollment (Reynolds, Temple, Robertson, & Mann, 2001) and facilitating higher academic achievement (Reynolds, 1994; Reynolds & Temple, 1998).

Consistent with these ideas, Reynolds and Temple (1998) examined the impact of continued participation in an intervention program beginning in preschool on children's

school performance during enrollment in primary grades. Based on the original sample of 989 children who entered the Chicago Child-Parent Center programs in preschool and kindergarten, 559 children who were enrolled in the school system during the third and seventh grade were selected for follow-up evaluation. Eligibility for program participation was based on economic and academic difficulties. Among the participants comprising the sample, 426 children who continued receiving services until second and third grade were compared to a group of 133 children who only received services through kindergarten. The program accentuates three critical components including the encouragement of parent involvement within the academic environment, providing comprehensive services, and child-centered activities designed to foster enhancements in mathematics, reading, and language skills. In addition, the program was offered on a half-day basis for preschool children, on a half-or full day basis for children in kindergarten, and on a full day basis for children between the ages of six and nine who were enrolled in the first to third grades.

To examine the effectiveness of the program on enhancing school proficiency, children were assessed in the third and seventh grades using measures of reading and math achievement, as well as through an investigation of rates of grade retention and special education placement. The Iowa Test of Basic Skills (ITBS) was utilized to assess achievement in mathematics and reading, while school records were reviewed to determine outcomes of grade retention and special education. In addition, measures of achievement were obtained from all participants prior to and following kindergarten enrollment to account for any differences that may have been attributed to original achievement levels. A comparison of the results between the two groups did not yield

any significant differences even when a correction method was used to control for any differences that may have been a result of sample selection bias due to attrition.

Children who participated in the intervention program through the second and third grade performed significantly better on measures of reading achievement and demonstrated lower rates of grade retention through the seventh grade than those in the comparison group. In the third grade, children who continued to receive intervention services performed significantly better on measures of both reading and math achievement than those who only received services until kindergarten. Further comparisons were made to ascertain whether any differences were apparent between children who participated in the intervention until second grade versus those who only participated until kindergarten as well as for those who participated until second grade versus those who participated until the third grade. Results indicated significant improvement in grade retention, reading achievement through seventh grade, and math achievement through third grade only for those who participated until third grade when compared to those who participated until second grade. Overall, these results provide support for the long-term effectiveness of extended preschool intervention programs.

To provide further support for the effectiveness of preschool intervention programs, Campbell, Pungello, Miller-Johnson, Burchinal, and Ramey (2001) assessed the long-term effects of early educational intervention on aspects of cognitive and academic development among poor, minority children through an examination of participants' cognitive and academic test scores over time. The study was conducted as an extension of the Abecedarian Project which examined an intensive infant, preschool, and early elementary school intervention implemented from 1972 to 1985 (Ramey &

Campbell, 1984). Originally, 111 infants were selected to participate in the study based on the results of at-risk screenings. Participants were matched in terms of level of risk and maternal IQ which was followed by random assignment to either a treatment group or a control group. Fifty-seven infants comprised the treatment group who received consistent intervention through a child-care center which offered an early education program geared toward language, cognitive, perceptual-motor, and social development. The control group was comprised of 54 infants who did not receive educational intervention on a regular basis but were exposed to various types of early care settings such as parental care and/or child-care resources in the community. All participants were provided with medical care as well as nutritional and social work services. It was hypothesized that early childhood treatment would foster improvements in cognitive-intellectual test scores over time, improvements in achievement test scores over time, and the impact of treatment on academic achievement would be guided by cognitive development following treatment.

To examine the effects of the intervention, participants were assessed during multiple time periods. Of the original sample of 111 infants, 104 were included during the follow-up assessment at age 21. Measures of intelligence were administered between the ages of 3 and 21 where the Stanford Binet Intelligence Scale: Form L-M was used when children were three and four years of age, the Wechsler Preschool and Primary Scale of Intelligence was used when children were five, the Wechsler Intelligence Scale for Children-Revised was used for children at ages 6.5, 8, 12, and 15, and the Adult Intelligence Scale-Revised was administered at the age of 21. In addition, measures of reading and math achievement were obtained at the ages of 8, 12, and 15 using the

Woodcock-Johnson Psycho-Educational Battery, Part 2: Test of Achievement and an updated version was administered at the age of 21.

Children who received the early educational treatment obtained higher IQ and academic achievement scores. Although differences between the treatment and control group were greatest while children were receiving the intervention, treatment differences were observed through the age of 21. The difference between the adjusted means for the cognitive test scores of the treatment and control group were 11.0 immediately following treatment and 5.71 at follow-up. Effect sizes calculated from the IQ test were .74 after treatment and .37 during follow-up. In terms of achievement scores, the adjusted mean difference between the treatment and control groups for reading and math were 6.8 and 5.5, respectively. Effect sizes calculated from the Achievement scores were .45 for reading and .37 for math. Effect sizes of these magnitudes are within the range of strong to moderate practical significance suggesting that it is unlikely that the revealed treatment differences occurred by chance. Thus, these results provide clinically meaningful support for the notion that early intervention can have long-term positive effects on a child's cognitive and academic development.

In a later study, Nelson, Westhues, and MacLeod (2003) conducted a meta-analysis to examine the short-, medium-, and long-term effectiveness of 34 preschool intervention programs as well as to investigate variables that may be related to the program's impact. The criteria for inclusion in the analysis was a) the intervention was implemented prior to age five, b) the intervention was directed toward enhancing the child, parent-child, or family well-being, c) research was documented in journal articles, chapters in a book, books, unpublished reports, and dissertations through the year of

2000, d) the utilization of a design with either a control group or comparison group, e) the inclusion and discussion of outcome variables assessing aspects of a child's cognitive functioning, social-emotional behavior as well as parent-family wellness, f) the study conducted a minimum of one assessment following a child's entrance into kindergarten and determined the impact on one of the three measures detailed previously, and g) results were described in a manner which enabled the determination of effect sizes. It was hypothesized that the preschool intervention programs involving either an explicit instructional component or a follow-through educational program continuing into elementary school would have a significantly greater impact on cognitive functioning when compared to programs without a direct teaching or follow-through element. Furthermore, it was predicted that program characteristics would be related to the program's effectiveness so that programs that were more intense, comprehensive, and of longer duration would foster greater improvements on both cognitive and socio-emotional functioning as well as parent-family wellness.

The results of the review indicated mean cognitive effect sizes of .53 for programs which incorporated a direct teaching component during preschool and .42 for programs which included a follow-through component during kindergarten through eighth grade which were significantly greater than the respective mean effect sizes of .09 and .20 for programs which did not. In addition, although the difference was not statistically significant, it is important to note that during kindergarten through eighth grade, the mean cognitive effect size of .30 for programs which included the educational aspect was larger than the effect size of .22 yielded for those which did not.

In terms of program characteristics, programs which were of one year or longer in duration yielded mean effect sizes of .53 for cognitive outcomes during preschool and .27 for social emotional outcomes during kindergarten through eighth grade and were significantly greater than the respective mean effect sizes of .09 and .06 for programs provided for one year or less. With regard to program intensity, interventions which consisted of more than 300 sessions revealed mean effect sizes of 0.57 for cognitive measures during preschool and .57 for social-emotional outcomes during kindergarten through eighth grade and were significantly greater than the respective mean effect sizes of .27 and .05 for programs comprised of a maximum of 300 sessions.

These results demonstrated that cognitive impacts were greatest for children enrolled in preschool programs with an explicit teaching component as well as for programs utilizing an educational follow-up component in elementary school. Furthermore, cognitive impacts resulting from the intervention programs were most significant in the short term, although some gains in cognitive functioning were still apparent in the long-term. Additionally, the social-emotional and parent family wellness impacts were similar across time. Moreover, interventions that were implemented for a longer duration and were more intense resulted in the greatest impact on all outcomes including cognitive, social-emotional, and parent-family wellness. Overall, these findings are fairly consistent with their hypothesis and provide clinically significant evidence in support of the short-, medium-, and long term effectiveness of preschool intervention programs.

Holistic Interventions/Creative Arts

The literature on the use of creative arts in early childhood suggests that incorporating techniques such as dance/creative movement, drawing, and music within the educational curriculum can have positive effects on early development and enrich cognitive, social, and emotional abilities (Pica, 1997; Weinberger, 1998). In fact, advocates of creative arts techniques with young children have claimed that this type of instruction provides greater opportunities to enhance learning than do typical early childhood educational programs (Berry, 1998). In addition, there is converging evidence which suggests that when children take part in creative art activities such as the combination of music and dance, it can enhance intelligence, creativity (Mohanty & Hejmadi, 1992), basic motor skills (Zachopoulou, Tsapakidou, & Derri, 2004) as well as the motor, auditory, and language elements associated with perceptual motor skill development (Brown, Sherrill, & Gench, 1981). Others have speculated that sensory-motor experiences, such as dancing to music, can promote stimulating connections between sensory input areas and connecting areas in the brain that are associated with motor responses (Honig, 2002). Moreover, proponents of music and dance with children suggest that activities providing movement and music exploration encourage freedom of communication and expression as well as opportunities to learn about themselves and their environment (McCall & Craft, 2000; Nichols & Honig, 1997; Weinberger, 1998). However, there are currently few empirical studies documenting results in support of these assumptions. As such, the effects of creative arts interventions on the early development of children are of interest.

According to Berry (1998), education through the arts is important for young children as it provides an array of benefits including preparation for learning, promoting

progression through the stages of development, providing a different form of learning, communicating, and expressing, facilitating imagination, problem solving, and taking multiple perspectives into consideration. To support the use of creative arts in the educational curriculum, Berry (1998) cited findings from research conducted on the Kaleidoscope Preschool Arts Enrichment Program, which provides inner city children with all day instruction in visual arts, music, and drama three to four times per week. Reports indicated that when students enrolled in the Kaleidoscope Preschool Arts Enrichment Program were compared to a matched control group of children attending a traditional early childhood program they demonstrated more significant improvements in various skills following assessment over the course of two years.

To examine the impact of creative arts interventions on enhancing intelligence and creative thinking, Mohanty and Hejmadi (1992) assessed the effect of three types of creative arts training in 40 preschool children between the ages of four and five. Participants were randomly selected from a preschool and equally distributed among one of four treatment groups. Participants in the control group did not receive any form of training. The remaining participants received either verbal training regarding the identification and use of their body parts, verbal and movement training allowing them to physically act out different purposes of body parts, or a combination of verbal, movement, and music training which required them to vocalize sounds to go with the dance movements.

Pre and post intervention data was collected using the Draw A Child Test and the Torrence Test of Creative Thinking. Participants in all treatment groups demonstrated significant gains following 20 days of training. More importantly, significant differences

were obtained between all group comparisons where participants who received training which incorporated verbal, movement and music activities demonstrated the most improvements when compared to those who participated in either the verbal or verbal and movement treatment groups.

To provide further support for the use of creative arts techniques in early childhood education, Zachopoulou, Tsapakidou, and Derri (2004) investigated the impact of a music and movement program on enhancing the development of jumping and dynamic balance in 90 children (42 girls and 48 boys) between the ages of 4 and 6 who were randomly selected from a preschool center. It was hypothesized that the 50 children in the experimental group who received the music and movement program would perform better on measures of jumping and dynamic balance when compared to the remaining participants who received a regular physical education program.

The music and movement program included three forms of movement including percussion movements (clapping, tapping knees), readiness and reaction movements, improvisation and creative movements. Creative movements enabled children to discuss their thoughts, emotions, and feelings through body and rhythm exploration accompanied by different types of music. Children in the regular physical education program participated in activities based on movement concepts used in the movement and music program including jumping and balancing tasks. In addition, all activities within each lesson of both programs were designed to impact the social, cognitive, and affective development of the participants. However, the two programs differentiated from each other in that no rhythmic accompaniment was incorporated into the regular physical

education program. Nevertheless, both programs were offered over the course of a two month duration.

Pre- and posttest data was gathered using the Motoriktest fuer vier-bis sechsjahriges kind (MOT 4-6), to examine any differences between groups in the level of development on the dependent variables of jumping and dynamic balance. Results of the study suggest that participants in the experimental group evidenced significant improvements in performance when compared to the control group. Thus, the combination of music and movement activities can result in positive outcomes regarding motor skill development, specifically those related to balancing and jumping.

Brown, Sherrill, and Gench (1981) conducted a study providing additional evidence corroborating the use of an integrated music and movement program on enhancing early childhood development. The study examined the impact of an integrated physical education/music program on perceptual-motor performance in children between the ages of four and six. Thirty children of normal intelligence or better were randomly assigned to either an experimental or control group. The 15 participants comprising the experimental group were provided with twenty-four sessions of an integrated physical education/music instruction over the course of ten weeks. The program was based upon repeated rhythmic activities intended to facilitate the natural rhythms of the body while training for economy and precision of movement. The remaining 15 participants in the control group received self-testing activities and game-like creative approach through a movement exploration program using teacher-student dialogue but no music or singing was incorporated.

Pre- and posttest data was collected using the Yellow Brick Road which is an instrument designed to provide a measure of motor, visual, auditory and language functioning as well as a total score. An analysis of covariance was computed for each of the dependent variables. Results revealed significant differences between groups where only participants in the experimental group demonstrated a significant increase in motor, auditory, language and total scores. These results suggest that an integrated physical education/music program is more effective at enhancing the motor, auditory, and language factors related to perceptual motor performance than a movement exploration and self-testing program using only student-teacher dialogue without the addition of singing and music.

The existing research on the use of creative arts techniques appears to reveal relatively consistent findings on the positive outcomes resulting from the integration of such activities within the educational curriculum. However, the empirical research examining the impact of creative arts interventions in early childhood is limited at the present time. Although a majority of the literature appears to offer justification for utilizing such activities, supporting evidence is drawn from few scientific studies which demonstrate various methodological flaws, use relatively small sample sizes or advocacy reports which are theoretically driven and/or descriptive in nature. In addition, conclusions derived from the research findings are based upon results using assessments which may be unreliable. Specifically, no mention is given to the reliability of some of the measures used to assess outcomes or details regarding a rationale for their use. As such, there appears to be a need for continued investigation in this area to determine the

impact that specific forms of art-related interventions can have on early childhood development.

Music

There is converging evidence proposing that music at an early age can provide stimulating experiences to promote brain development and in turn, offer a means to enhance learning (Strickland, 2001; Weinberger, 1998). Furthermore, participation in music activities offers an effective method for children to acquire cognitive, motor, communication, and social/emotional skills (Humpal, 1990) as well as improve skills in various academic areas (James, 2000; Register, 2001; Standley & Hughes, 1997). In fact, researchers have shown that music activities can facilitate learning and skill acquisition in subject areas such as reading (Cutietta, 1995) and math (Weinberger, 1998; Rauscher, 2003). Moreover, researchers have demonstrated that exposure to music can stimulate higher cognitive functions associated with spatial temporal reasoning (Bilhartz, Bruhn, & Olson, 1999; Gromko & Poorman, 1998; Rauscher, 1999; Rauscher, 2003; Rauscher, Shaw, Levine, Wright, Dennis, & Newcomb, 1997), which are critical skills involved in the performance of academic areas such as math and science (Rauscher, 1995). Therefore, researchers have begun to gain interest in the impact that music can have on aspects of early childhood development.

Music and Writing/Prereading Skill Acquisition

Standley and Hughes (1997) conducted a study assessing the effects of music sessions designed to increase prereading and writing skills. Participants in the experimental group consisted of 24 children who met criteria for early intervention services or Exceptional Student Education. In addition to the regular academic

curriculum, two groups of 12 children each were provided with the intervention during either the fall or spring session. The intervention consisted of a total of 30 music sessions which were offered for 15 minutes twice a week over the course of seven and a half weeks. Children in the control condition were provided with the regular academic curriculum without the additional music component.

During the fall, the intervention consisted of music lessons designed to foster improvements in writing skills. Music sessions consisted of activities designed to foster improvements in understanding of print concepts including alphabet recognition, modeling of reading while simultaneously directing a musical tune, and the utilization of pictures in books and on postures that included noun labels to go with the song activities. In addition, writing skills were introduced through musical songs that verbally instructed writing tasks. During the last five minutes of each session, children engaged in tasks which were designed to reinforce and practice the writing skills they learned including writing about what was taught and their name.

During the spring session, children were provided with music lessons which were geared toward enhancing book concepts and prereading skills. The intervention consisted of instruction that was similar to what was offered during the fall in that it included concepts related to print awareness and writing skills. However, participants also received additional instruction that was geared toward enhancing reading skills. For example, the words to a different song were chosen each week and presented to children in print form. Children were also instructed to make illustrations about the song on their song sheets. During the course of the intervention, the songs were compiled into a songbook and children were taught to find the front of the book, each of the songs by

page number and/or the drawing they created, to place their finger on the first word, as well as to follow along with the music by placing their fingers on each word as they sang the song.

Participants were assessed prior to receiving the intervention, at the end of the fall session, and at the end of the spring term. Three dependent measures were used to assess oral/written language skills including a Print Awareness Test for Logos, a Print Concept Checklist, and the Developmental Writing and Language Skills Checklist. Participants were assessed using only two of the three measures. Children who participated in the fall intervention demonstrated significant improvements in prewriting skills. Additionally, participants in the spring intervention evidenced significant gains in their understanding of print concepts and prereading skills.

Similarly, Register (2001) conducted a duplication of the study done by Standley and Hughes (1997) in order to examine the efficacy of a music program specifically intended to promote prereading and writing skills in preschool children between the ages of four and five. Among the 61 participants who comprised the initial sample, a total of 50 were present for the post-testing, with 25 in the experimental group and 25 in the control group. Participants in the experimental group received 60 music sessions for 30 minutes twice per week over the course of 30 weeks. The interventions consisted of activities which were similar to those used in the aforementioned study conducted by Standley and Hughes where children were provided with music instruction explicitly designed to promote writing skills during the first fifteen weeks, while an additional emphasis was placed on prereading and book concepts during the second 15 weeks. During the first fifteen weeks, children were instructed on how to write and draw about

the music activity. During the second fifteen week period, children were shown the words to a different song each week and gradually developed a songbook. In addition, they were requested to make drawings of the songs and introduced to various print/book concepts. Participants in the control group received music lessons of equal amount and duration but without the additional component of specific instruction in prereading/writing skills.

Pre- and post test data was obtained for all participants using three dependent measures including The Print Awareness Logo, The Print Awareness Test of Word Identification, and The Print Concepts Checklist. There were significant differences between pretest and posttest scores for both groups on the print awareness measures of logo identification and word recognition. However, pretest findings assessing print concepts were significantly different with the experimental group performing significantly better at the beginning of the study. For this reason, although only the control group demonstrated significant differences in scores from pretest to posttest, caution should be taken when interpreting these scores. Furthermore, no significant differences were revealed when a comparison was made between the results of the control and experimental groups. In summary, while the results demonstrated that participants made progress over time, it is difficult to ascertain whether the interventions were directly related to the improvements apparent. The gains made by both groups and the methodological flaws within this study warrant a need for further investigation to determine whether music can enhance prereading and writing skills in preschool children.

Music and Spatial Reasoning Skills

Researchers have suggested that music training can have a positive effect on specific areas of cognitive development (Gromko & Poorman, 1998; Leng, Shaw, & Wright, 1990; Orsmond & Miller, 1999; Rauscher, 2003; Rauscher, Shaw, Levine, Wright, Dennis, & Newcomb, 1997). Presumably, the assumption that early music instruction can influence spatial task performance is based upon theoretical models demonstrating three similarities in the developmental progression of spatial and musical intelligence (Gromko & Poorman, 1998). According to Gromko and Poorman (1998), the acquisition of spatial and musical intelligence is dependent on an individual's sensory motor experiences so that musical training that requires a child's motor system can influence a child's spatial task performance. Additionally, both musical sound and spatial memories share a common feature in that both types of information are organized hierarchically. In turn, the similarities in structure provide implications for a resemblance in the development of visual and audio awareness. Furthermore, the impact of recalling temporal sequence can enhance an individual's memory for space as well as the sounds of music.

Leng, Shaw, & Wright (1990) developed a neurobiological model, known as the Trion model, which offers an alternative explanation to describing the connection between music and spatial-temporal reasoning. According to this model, an individual's ability to compare and identify existing commonalities among patterns is guided by spatial-temporal firing patterns of highly structured, interconnected neuronal groups throughout various regions of the cortex. Furthermore, the model proposes that music cognition requires the identical firing patterns of neurons that are involved in the performance of various spatial-temporal reasoning tasks. Based on this assumption and

the idea that learning and experience can facilitate an improvement in these neural patterns, it is suggested that music activities may stimulate the cortical patterns involved in spatial-temporal reasoning and therefore, facilitate an improvement in the cognitive abilities required for the performance of spatial-temporal reasoning tasks. Nonetheless, although theorists have speculated that music cognition is associated with the same neuronal firing patterns that are related to a wide range of spatial-temporal reasoning tasks, there is currently no empirical evidence in the neurophysiological literature to support this notion.

Based on the theoretical principles regarding spatial memory, Gromko and Poorman (1998) assessed the impact of music training on preschoolers' Performance IQ through the utilization of five spatial temporal tasks included in the Wechsler Preschool and Primary Intelligence Scale-Revised. Thirty preschool children between the ages of three and four were equally distributed among a music treatment group and a no music control group. Children in the treatment group received a music intervention which was intended to facilitate active engagement in sensory motor activities while simultaneously providing children with assistance in the perception of and memory for music's tonal contour and rhythmic pulse. No description was offered of what the participants in the control group received.

The treatment group demonstrated significantly greater improvement in raw scores than the control group. However, following a regression analysis of gains in Performance IQ scaled scores on age, slopes intersected at age three. This suggests that music training for three-year old children can have positive effects on a child's cognitive abilities whereby the stimulation can foster an increase in the ability to perform spatial

temporal tasks. However, regressions indicated that Performance IQ gain scores were significantly smaller for the four-year-old children in the control group. Specifically, music training provided steady gains for the four-year-old children in the treatment group, while the gains decreased significantly for the children comprising the control group. Thus, since the results revealed such small differences between the alpha levels for both the raw and scaled scores of the Performance IQ, the authors suggest that these findings be considered with caution. In addition, they reported that results of the study may be enhanced by increasing the sample size and length of treatment as well as utilizing a sample of children within a different environment. More specifically, it was indicated that because children in the sample were derived from students enrolled in a Montessori program where they were engaged in an intellectually stimulating setting, received weekly music classes, and profit from activities provided by their parents outside of the academic setting, it may be difficult to conclude that the music intervention was solely responsible for the demonstrated gains. Nevertheless, based on the facts that both groups were taken from the same educational environment, the treatment group revealed significantly larger mean improvements on the Performance IQ, and that the improvements were steady across the different age groups, the authors believe that these results provide evidence supporting the notion that music training can facilitate positive outcomes on the acquisition of spatial intelligence in preschool-aged children.

Working from the Trion Model (Leng, Shaw, & Wright, 1990), Rauscher, Shaw, Levine, Wright, Dennis, and Newcomb (1997) conducted a study investigating the effects of music keyboard training on enhancing spatial temporal reasoning skills in 78 preschool children between the ages of three and four years old. Thirty-four children were

assigned to the treatment group and received 10-minute keyboard training which provided instruction on pitch intervals, fine motor coordination, fingering techniques, sight reading, music notation, and performance by memory. In addition, children were given 30 minute group singing lessons every day of the week and were required to practice keyboard for one hour on a daily basis. The rest of the participants were assigned to a singing, computer, or no lesson group. The singing group was comprised of 10 children who participated in the singing lessons which were provided to those in the keyboard group. The 20 children in the computer group received computer training which consisted of the same amount and length of keyboard lessons, while the 14 children in the no lessons group did not receive any form of intervention.

Pre- and posttest data was collected using 4 spatial reasoning measurements of the Wechsler Preschool and Primary Scale of Intelligence-Revised. The Object Assembly subtest was administered to assess spatial-temporal reasoning skills, while the Geometric Design, Block Design, and Animal Pegs were used to evaluate spatial recognition. A comparison of the test scores between those in the treatment group and those in the control groups revealed that although none of the groups demonstrated significant improvements on the spatial recognition tasks, the children in the keyboard group demonstrated significant improvement on the spatial temporal test while those in the control group showed no improvements. Thus, these results suggest that early keyboard training can have a specific effect that facilitates spatial temporal reasoning skills. Furthermore, based on the notion that subject areas such as mathematics and science require spatial temporal reasoning abilities, one implication made was that such evidence

provides support for the possibility that early music training can enhance competencies in other academic areas.

In a later study, Bilhartz, Bruhn, and Olson (1999), further investigated the link between early music training and cognitive development. Based upon the assumptions of the Trion Model (Leng, Shaw, & Wright, 1990), it was hypothesized that music exposure would lead to enhancements in spatial reasoning skills. Seventy-one preschool children between the ages of four and six years old were assigned to either an experimental treatment group or a control group receiving no treatment. Pre- and post-test measures were collected using the Young Child Music Skills Assessment and six subtests from the Stanford Binet Intelligence Scales, fourth edition, including Vocabulary, Memory for Sentences, Bead Memory, Pattern Analysis, Quantitative, and Copying. The authors cited research on the Stanford Binet suggesting that all six subtests tap general intelligence, while the Vocabulary and Memory for Sentence are measures which have a high loading on the verbal domain, and the Bead Memory, Quantitative, and Pattern Analysis subtests are measures with higher loadings of the abstract reasoning factor. In addition, they indicated that the Copying subtest was a good indicator of test specificity and a poor measure of abstract reasoning. Significant improvements for children in the treatment group on the Young Child Music Skills Assessment as well as on the Bead Memory subtest of the Stanford Binet, which assesses aspects of abstract reasoning skills. Therefore, these results provide further support for the notion that there is a positive relationship between early music training and cognitive development. Furthermore, the relationship apparent between the music treatment group and the Bead Memory scores provides further evidence for the idea that engagement in musical activities require the

same brain patterns that are involved in the performance of spatial-temporal reasoning tasks as the Bead Memory subtest evaluates the cognitive processes related to visual imagery and sequencing techniques.

Examination of the research on the implementation of music interventions in early childhood failed to reveal consistently reliable findings to support positive effects on development. Although a majority of the studies indicate positive benefits as a result of musically stimulating activities, contradictions in research findings suggest a need for improved methodology to determine the impact of music interventions in preschool. Among the studies reviewed, many either offer brief validation for the utilization of the assessments and on how they measure the specific variables of interest, use small sample sizes, or include possible confounds due to sample selection, age, or demographics. In addition, methodological flaws make it difficult to assert whether the music interventions were the sole reason for fostering improvements. Therefore, there appears to be a need for continued research in this area to assess the impact that music interventions can have on early childhood development.

Creative Movement/Dance

Movement offers a way for children to learn both physiologically as well as cognitively as they are provided with a hands on opportunity to solve problems and develop solutions as well as make abstract concepts concrete (Pica, 1997). The literature on movement and dance has consistently emphasized the importance of movement activities during early childhood, suggesting that actions such as crawling, creeping, turning, walking, skipping, reaching, and swinging are vital to a child's early brain development (Gilbert, 2001). More specifically, researchers have offered the notion that

the wiring that is needed to promote the development of movement abilities and motor control skills occurs during the first years of a child's life (Schiller, 2003). Furthermore, reports have speculated that through engagement in movement activities children use their entire body and senses which enables them to stimulate the nervous system to facilitate the development of perceptual/motor functions, nerves, and brain cells (Gilbert, 2001). However, there is currently no empirical evidence demonstrating that the changes in neurophysiology are directly related to these forms of interventions.

Researchers have suggested that during early childhood learning to move and learning through movement is critical for skill development (McCall & Craft, 2000; Pica, 1997; Stinson, 1989; Stinson, 1990; Wang, 2004), intellectual development, and personal expression for children (McCall & Craft, 2000; Pica, 1997). In addition, movement activities provide an optimal environment to promote interactions and enhance social skills for children with greatly diverse abilities, levels of intelligence, and backgrounds (Hartshorn, Olds, Field, Delage, Cullen, & Escalona, 2001; Pica, 1997). This has led others to propose that creative movement activities provide opportunities for imagination, problem solving, and discovery, which can in turn facilitate creativity (Jay, 1991; Pica, 1997; Wang, 2004). Moreover, supporters of creative dance for preschool children have claimed that dance and movement awareness can foster language development by providing children with experiences to discuss movement concepts related to body, space, time, energy, and connections (Stinson, 1989; Stinson, 1990). Furthermore, the movements carried out through dance can be used to form visual images and thus provide a means for expression of feelings and expanding on meaning (Dimondstein, 1985). Thus, by providing such opportunities for movement exploration and sensory awareness,

dance can be perceived as an art form which serves as a basis for facilitating the development of abstract concepts and more complex skills (Stinson, 1989; Stinson, 1990).

According to Stinson (1990), there is a relationship between movement and cognitive development whereby dance provides children with concrete experiences in which they not only have the opportunity to explore movements but they learn to become aware of the associated body sensations. In addition, it is suggested that exploratory movement and sensory awareness not only provide a means for children to learn about themselves and their surroundings but are also vital components in the development of motor skills (Stinson, 1990). Others have proposed that primary learning in childhood is based upon motor development where physical activity aides in the development of the nerve cell networks necessary for learning (Pica, 1997). In fact, researchers have suggested that the initial years of a child's life are such a crucial time for motor skill development such that if a child does not become proficient in basic movement skills during the preschool years it can leave them at a disadvantage (McCall & Craft, 2000). However, in order to enhance a child's motor skill development, continuous practice and repetition is necessary so that the child is able to progress through the normal maturational process of motor skill attainment and build upon the motor skills acquired during earlier stages (McCall & Craft, 2000; Pica, 1997; Wang, 2004). In turn, movement instruction in early childhood is an essential component needed for preschoolers to form the basis for acquiring more complex skills (McCall & Craft, 2000, Stinson, 1989; Stinson, 1990).

Creative Movement/Dance and Gross Motor Skill Acquisition

There is a growing body of literature suggesting that dance and creative movement activities in early childhood can promote the development of gross motor skills (Wang, 2004). Wang (2004) examined the impact of a creative movement program on 60 children between the ages of thirty-six months and seventy-one months who were randomly selected from a preschool. Participants were divided equally between two groups. The experimental group received intervention through a creative movement program while the control group participated in an unstructured free-play setting. The creative movement program was provided two times per week over a six week period and was led by a certified creative dance instructor who held a doctoral degree in early childhood education. Lessons were guided by specific plans consisting of warming up, exploring the concept, developing skills, creating, and cooling down.

Pre- and post intervention data was collected from the experimental and control groups using the Peabody Picture Developmental Motor Scales-Second Edition (PDMS-2) to identify changes in gross motor skills as well as differences on the subtests assessing object manipulation, stationary skills, and locomotion. Significant differences existed among the two groups in both gross motor skills and locomotion scores. However, no significant differences were found between children in the experimental and control groups in object manipulation scores and stationary scores. The authors suggest that significant differences in these domains may not have been revealed as the creative movement program involved ongoing movement activities with much less emphasis on tasks tapped by the object manipulation and stationary subtests.

Creative Movement/Dance and Social Skill Development for Children with Autism

Apart from the existing research demonstrating the positive effect on gross motor skills, the literature demonstrates that creative movement activities can be used to stimulate socially appropriate interactions and improve the social and classroom skills of autistic children (Hartshorn, Olds, Field, Delage, Cullen, & Escalona, 2001). Hartshorn et. al. examined the impact of a movement therapy program on autistic children. It was hypothesized that movement therapy would provide an increase in attentive behavior and social relatedness and a reduction in stress related behaviors.

The experimental group was comprised of thirty-eight autistic children between the ages of 3 to 8 who were enrolled in a school for autistic children. Participants received 30 minute movement therapy classes two times per week over the course of two months which were provided in small groups by trained movement therapists. Pre and posttest measures were obtained through observations of specific behaviors during the first and last sessions. More specifically, the documented behaviors consisted of attentive behaviors as measured by on-task behavior including either actively interacting or passively observing, social relatedness directed toward or avoiding the teacher, and stress behaviors as measured by stereotypical behaviors, negative reactions to touch and teacher resistance.

A second group of children attending the same school were matched on age and developmental level with those in the movement therapy group and comprised the participants of the control group. Pre and posttest measures were collected through observations documenting the above behaviors during a movement therapy class at the beginning and ending of the treatment period. Participants in the experimental group demonstrated improvements in their attentive behaviors and stress behaviors where they

spent a shorter amount of time wandering around the room, evidencing negative reactions to touch, and teacher resistance as well as a greater deal of time displaying on-task passive behavior when compared to children in the control group. These results suggest that a movement therapy program can provide positive effects on autistic children's level of attentive, stress, and social relatedness behaviors.

Creative Movement/Dance and Creativity

Additionally, there is converging evidence suggesting that creative movement can enhance creativity in young children (Jay, 1991; Pica, 1997). More specifically, movement activities provide opportunities for stimulating creativity and imagination through play, exploration, problem solution, and open communication and expression (Jay, 1991; Pica, 1997). Jay (1991) investigated the impact of a dance program on the level of creativity in 17 handicapped children between the ages of 3 to 5 who were enrolled in two preschools. More specifically, the study was designed to provide a dance program for children demonstrating speech and language delays of varying levels which would foster improvements in children's aesthetic experiences as well as determine the effects of the program on enhancing creativity.

Each of the preschools provided children with two programs, where 12 children participated in a dance program and 5 were provided with an adapted physical education program. Children participating in the dance program received 30 minute classes which were offered 3 days per week over the course of 3 weeks. During the same period, the children in the adapted physical activity program received training from a physical education teacher and participated in game activities which used balls, ropes, hoops, and different gymnastic equipment.

The dance program was designed to promote body awareness through sensory stimulation and effort actions. Effort actions were movements identified by Laban and Lawrence (1947) which consisted of the integration of aspects of space, time and weight. More specifically, children were taught effort actions such as dab, flick, glide, float, press, wring, punch, and slash. It was hypothesized that the movements taught through the dance curriculum would provide experiences for responding, creating, expressing, and communicating ideas.

Pre- and post-intervention measures of creativity were obtained using Torrance's (1981) Thinking Creatively in Action and Movement (TCAM) as a means of assessing the dependent measures of fluency, imagination, and originality. Results revealed that participants in the dance group performed significantly better to those in the adapted physical education program on only the factor assessing imagination. No significant differences were apparent between groups on the dimensions of fluency and originality. As such, these results provide support for the notion that the dance program can significantly enhance imagination in preschool handicapped children.

Creative Movement/Dance and the Development of Reading Skills

Based upon the notion that imagery, memory, and elaboration are abilities associated with both reading and dance, researchers have hypothesized that dance procedures intended to foster the processes involved in language development also has implication for potential increases in their reading skills (McMahon, Rose, & Parks, 2003). Furthermore, it has been suggested that by placing a greater emphasis on the use of visual and kinesthetic images and less on text-based information, it would provide children with a more effective approach to derive meaning from the information and

therefore enhance the possibility for retaining and retrieving the learned material (McMahon, Rose, & Parks, 2003). As such, the assumption is that if dance is used as a technique to teach children to use visual strategies by physically forming symbols to represent sounds, dance can be used to enhance reading skills.

McMahon, Rose, and Parks (2003) investigated the impact of a curriculum based reading intervention which incorporated dance techniques on enhancing first grade students' earliest reading abilities. The danced-based reading curriculum was designed to enhance phonetic skills by teaching students to associate visual cues with the sounds they represent.

Seven hundred and twenty one first grade students comprised the participants of the study with 328 in the experimental group and 393 in the control group. However, due to attrition, only 630 students were available for assessment during posttest, with 293 in the experimental group and 337 in the control group. Participants in the experimental groups received a total of 20 40 minute sessions of a dance-based reading curriculum, Basic Reading Through Dance (BRD), which were provided twice per week over the course of 10 weeks. Sessions involved a visual strategy for learning to read where students were taught to use their bodies to make shapes of letters and letter blends to represent sounds. In addition, sessions were designed to progress in level of difficulty so that earlier sessions provided a foundation for the skills taught in more advanced sessions.

In order to examine the impact of the BRD, pre- and posttest measures for participants in the experimental and control groups were obtained using the Phono Graphix Test, a standardized assessment of basic reading skills which examines four core

areas including code knowledge, phoneme segmentation, blending, and phoneme manipulation. For the purposes of this study, only the code knowledge and phoneme segmentation subtests were administered to assess the dependent measures of consonants, vowels, and overall phoneme segmentation.

Several analyses were conducted to examine the outcomes of the curriculum implementation. Initially, a comparison of the two groups was done to determine any differences. Results revealed that the control group performed better on pretest measures when compared to participants in the experimental group. In turn, interactions between pretest measures and groups condition were investigated to assess whether any improvements were a result of lower pretest scores rather than participation in the program.

Additionally, an analysis was conducted to determine whether any group differences were a result of attrition. Results indicated that although the control group demonstrated slightly higher overall attrition, differences were unrelated to reading skills and should therefore not be attributed to outcome differences between the two groups.

Independent-samples t-tests were conducted to assess improvements in reading skills between the experimental and control groups. Results revealed that students in the experimental group demonstrated significantly greater improvements on all dependent measures when compared to those in the control group. Specifically, students in the experimental group evidenced significantly greater improvements in their ability to accurately identify written consonants with the spoken sounds of the letters, recognize written vowels for the spoken sounds of the corresponding letters, and segment the sounds of spoken words following participation in the reading program. As such, the

findings of this study suggest that although it can not be concluded that dance in itself can result in reading improvements, a reading curriculum which incorporates dance techniques as a learning strategy geared toward enhance reading skills can have positive outcomes on these abilities. In other words, these results imply that integrating dance with curriculum based reading instruction can foster improvements in academic reading instruction.

Overall, a review of the existing literature on creative movement interventions provides consistent evidence in support of being an effect means to enhance various areas of early childhood development. However, although reports have been documented implying the positive outcomes for using creative movement/dance as a form of intervention with young children, very few empirical studies have been conducted demonstrating evidence for such claims. Although some studies appear to reveal valid findings, a majority of the relevant literature has been based on theoretical speculations. In addition, while it appears that when the interventions are designed to directly enhance academic and cognitive skills they can facilitate positive outcomes for young children, few studies examining their impact have used large enough sample sizes to draw these conclusions and methodological flaws in others make it difficult to ascertain whether the incorporation of dance/creative movement techniques are directly related to the improvements observed. As such, a need for further examination in this area is warranted to assess the impact that creative movement/dance intervention can have on early childhood development.

Yoga can be conceptualized as a stimulating activity which involves bodily postures, breathing exercises, and meditation (Kassow, 2004) as well as both physical and mental control (Streuer, 1987). Although there are many types of yoga, these characteristic features are common to all forms of the exercise (Kassow, 2004) and have been described as an appropriate form of physical activity for a variety of children regardless of age or athletic ability (Gervais, 2003). In fact, Krebs (1979) suggested that children can benefit from the practice of yoga as it extends and stimulates the muscles while simultaneously regulating the circulatory, respiratory, excretory, digestive, endocrine, and nervous systems. Furthermore, with the assumption that a majority of learning and developmental disabilities are associated with a nervous system dysfunction, advocates of the practice have speculated that the postures involved in yoga as well as the breathing and relaxation exercises can offer a means for calming and strengthening the central nervous system (Moran, 2000).

Although derived from traditional techniques, yogic practice for children incorporates modified strategies which are designed to meet a child's needs. For example, the performance of yoga with infants includes stimulating activities, as well as massage, games, and an array of exercises requiring rocking and balancing (McLaughlin, 2003). In addition, children's yoga is conducted in more of a play form which is noisier as well as more improvisational and theatrical than that of adult classes (Moran, 2000). Furthermore, deep breathing, imagery, relaxation, mental concentration, singing, and story telling are often included in yoga lessons for children (Gervais, 2003; Moran 2000).

Through practice and performance of yoga, researchers have suggested that various aspects of a child's development can be enhanced such as intelligence, social

adaptation (Uma, Nagendra, Nagarathna, Vaidehi, & Seethalakshmi, 1989) and static motor skills (Telles, Hanumanthaiyah, Nagarathna, & Nagendra, 1993). Additionally, the performance of yogic techniques can offer children a way to learn behaviors such as concentration and patience (Gervais, 2003; Khalsa, 2003; Streur, 1987; Telles, Hanumanthaiyah, Nagarathna, & Nagendra, 1993).

Advocates of the yogic practice with children have claimed that yoga provides a means for stress reduction and acquiring appropriate relaxation techniques as well as an improvement in self-esteem, listening skills, balance and discipline (Boyajian, 2004; Gervais, 2003; Kassow, 2004; Khalsa, 2004; Streur, 1987). Other supporters believe that the breathing techniques children engage in during the performance of yoga can result in the reduction of tension, blood pressure, and digestive problems, while positively impacting the immune system and sleeping patterns (Boyajian, 2004; Laughlin, 2003). According to Boyajian (2004), yoga can also be beneficial for children with special needs by providing them with the opportunity to develop better motor skills and articulation as well as increased body awareness. Through yoga, children with special needs can increase muscle tone and flexibility, develop better posture, eye contact, social skills, calmer disposition, and ways for relaxation (Boyajian, 2004).

Uma, Nagendra, Nagarathna, Vaidehi, and Seethalakshmi (1989), examined the efficacy of yoga therapy on enhancing intelligence and social adaptation in children with mental retardation. Participants of the study were comprised of 45 pairs of children with a chronological age between six and sixteen who were diagnosed with mild, moderate, and severe mental retardation. Participants in the experimental and controls groups were selected and matched from the same school to account for any differences that may have

been attributed to socio-environmental backgrounds and allow for comparison of results. The 45 pairs of children were initially matched according to age, gender, and IQ and then randomly divided among either the experimental or control group. Participants in the experimental group received training from competent yoga instructors in a combination of 4 yogic strategies including breathing exercises, joint loosening exercises, specific postures involving bending and slow breathing procedures, and meditation. Yoga training was provided to students for one hour on five days per week over the course of one school year. Participants in the control group did not receive any yoga training but were exposed to the same regular curriculum as students in the experimental group.

Pre and post test data was collected for all participants using two measures of IQ and one to assess social maturity. Results revealed that participants in the control group demonstrated significant improvement on one IQ measure but no differences were apparent on the other IQ measure and deterioration in scores were evident on the measure of social adaptation.

Additionally, Telles, Hanumanthaiah, Nagarathna, and Nagendra (1993), examined the effect of yogic training on enhancing static motor performance. Participants of the study were comprised of 90 children between the ages of 9 to 13, with 45 in the experimental group who received a 10 day yoga training program and 45 in a control group who did not receive yogic training. The yoga program consisted of approximately 8 hour daily sessions of training in 1) Yogasanas, distinct postures intended to enhance physical stamina as well as physical and mental balance; 2) Pranayama, voluntary regulation and slow breathing exercises performed to arrive at a relaxed mind frame and enhance inner awareness; and 3) Kriyas, procedures to promote

cleansing of the internal organs. One of particular relevance was that of *tratakas*, which refers to an eye cleansing technique requiring concentration.

To examine the effects of the training, pre and post-intervention measures were obtained for both groups using a hand steadiness test. The assessment required students to insert a metal stylus into holes of a metal plate which reduced in size. Without touching the sides of the holes, participants were then requested to hold the pieces in the holes for 15 seconds and then remove them. Participants were scored based on the amount of times the stylus touched the sides. Results revealed that participants demonstrated significant improvement at post-test when compared to the performance of those in the control group. Thus, a 10 day yogic training program may enhance static motor performance. Two implications made were that the teaching and practicing of the yogic postures may have provided a means to improve voluntary control and hand eye coordination, while the incorporation of *tratakas* may have enhanced concentration so that the level of attention improved during task performance.

Furthermore, Kassow, (2004) conducted a research based synthesis examining the impact of yoga on the social-emotional, intellectual, behavioral, and physical development of young children as well as to investigate the effectiveness of yoga when used with children with or at risk for developmental delays or disabilities. An analysis was performed on 15 studies which reported outcomes on the effectiveness of yoga interventions with children. Participants in the studies consisted of 535 children between the ages of 4 and 18 who were identified as being with and without developmental delays. A majority of the interventions incorporated yoga postures, breath work, and rest or relaxation. Two of the studies involved the use of storytelling and/or visualization and

one study included yoga stretching and meditation. The yoga interventions were implemented for a duration of 2 to 40 weeks.

Positive outcomes were reported on the dimension of behavior where children demonstrated reductions in their rates of disruptive behaviors and had less difficulty becoming quiet in the classroom environment following involvement in a yoga session. In the area of physical functioning, children demonstrated improvements in posture, flexibility, and balance and there was an increase in the amount of children who received passing scores on the school fitness exam after receiving yoga interventions. In addition, gains were evident in the cognitive area where children obtained higher scores on intelligence tests and improved in their performance of academic subjects and in their ability to engage in decoding tasks after they received training in yoga. Furthermore, positive changes on the dimension of sensory motor skills were indicated where children demonstrated enhancements in their visual, auditory, and ocular skills following the implementation of yoga interventions.

Nevertheless, apart from the benefits revealed from these studies, the authors identify several procedural and methodological flaws that deem the results insufficient for supporting the idea that yoga is the sole factor responsible for the positive outcomes. For one, the authors provide brief descriptions of the procedures involved in the yoga treatment as well as the measures used to assess outcomes. In addition, the designs of the studies were weak in that they typically did not randomly assign participants to groups nor did they incorporate control groups. Furthermore, a majority of the studies either did not perform any statistical analyses or conducted inadequate analysis leading to questionable results. Finally, five threats to internal validity were reported as potentially

being accountable for the observed effects. Overall, the methodological flaws apparent in all of the studies and failure to control for any extraneous variables which may be related to the implied benefits suggests that the results of all of the studies can not be interpreted as providing empirically based support for the effectiveness of yoga with young children with or at risk for disabilities or delays.

As is apparent with the literature on the use of dance techniques as a form of early intervention, little scientific research exists to support documented claims implying the benefits for using yoga with children. A majority of the literature is either theoretical in nature, unreliable reports, or an investigation of yoga with children above the preschool ages. For this reason, there is a significant need of empirical studies to investigate the effect of using yoga as an appropriate form of stimulating intervention with the early childhood population.

Purpose of the Present Study

The purpose of this study was to add to the existing knowledge base concerning the impact of early childhood interventions designed to enhance development. Although an extensive amount of literature has demonstrated that holistic interventions can positively impact various aspects of a child's development, the current study was intended to examine the effects of dance, music, and yoga enhancements on a child's cognitive and developmental abilities. Specifically, the study attempted to assess whether these forms of interventions would result in significant improvements in overall cognitive functioning, fine motor skills, expressive and receptive language, and visual reception for children between the ages of two to five.

Hypotheses

Overall Developmental Domain

H-I: Children who receive dance enhancements will demonstrate significant improvements on the overall IQ measure of the Mullen Scales of Early Learning.

H-II: Children who receive music enhancements will demonstrate significant improvements on the overall IQ measure of the Mullen Scales of Early Learning.

H-III: Children who receive yoga enhancements will demonstrate significant improvements on the overall IQ measure of the Mullen Scales of Early Learning.

Fine Motor Domain

H-IV: Children who receive dance enhancements will demonstrate significant improvements on the Fine Motor Scale of the Mullen Scales of Early Learning.

H-V: Children who receive music enhancements will demonstrate significant improvements on the Fine Motor Scale of the Mullen Scales of Early Learning.

H-VI: Children who receive yoga enhancements will demonstrate significant improvements on the Fine Motor Scale of the Mullen Scales of Early Learning.

Expressive Language Domain

H-VII: Children who receive dance enhancements will demonstrate significant improvements on the Expressive Language scale of the Mullen Scales of Early Learning.

H-VII: Children who receive music enhancements will demonstrate significant improvements on the Expressive Language scale of the Mullen Scales of Early Learning.

H-IX: Children who receive yoga enhancements will demonstrate significant improvements on the Expressive Language scale of the Mullen Scales of Early Learning.

Receptive Language Domain

H-X: Children who receive dance enhancements will demonstrate significant improvements on the Receptive Language scale of the Mullen Scales of Early Learning.

H-XI: Children who receive music enhancements will demonstrate significant improvements on the Receptive Language scale of the Mullen Scales of Early Learning.

H-XII: Children who receive yoga enhancements will demonstrate significant improvements on the Receptive Language scale of the Mullen Scales of Early Learning.

Visual Reception Domain

H-XIII: Children who receive dance enhancements will demonstrate significant improvements on the Visual Reception scale of the Mullen Scales of Early Learning.

H-XIV: Children who receive music enhancements will demonstrate significant improvements on the Visual Reception scale of the Mullen Scales of Early Learning.

H-XV: Children who receive yoga enhancements will demonstrate significant improvements on the Visual Reception scale of the Mullen Scales of Early Learning.

Method

Sample and Procedures

Approximately fifty-six children enrolled in a local YWCA center were proposed to comprise the participants of this study. However, following access to the data, a total of 58 participants between the ages of two to five were included in the original sample. According to their age, each child received one of three interventions on a weekly basis. More specifically, 19 two-year-olds participated in creative movement/dance once a week for a duration of 45 minutes. During the creative movement class children learned about counting, rhythm, body parts, spatial skills, pantomime, and balance. Next, musical exploration was provided to 20 three-year-olds for 30 minutes one time per week. These classes enabled children to learn to keep a beat to different rhythms, follow along with voices, records and songs, as well as to use a variety of instruments. Finally, 19 four-year olds engaged in 30-minute yoga classes one time per week where they were exposed to basic yogic movements as well as the utilization of the meditation process to quiet themselves. In addition, a control group consisted of 25 children between the ages of birth to three-years old who attended a nearby YWCA center where no interventions were provided. Since only children between the ages of two to five comprised the treatment group, only the results of children from 24 to 25 months of age attending the nearby YWCA were to be compared to the two-year-old age group of children in the treatment group. This was intended to provide an additional means for examining the effect of the dance intervention.

To determine the impact of the program interventions on various areas of early child development, pre- and post-intervention test measures were obtained through the

assessment of all children at the beginning and end of the school year. However, as a result of attrition and turnover, the number of children who completed both pre- and post-intervention assessments varied. Specifically, posttest measures were obtained from only 12 two-year-olds, 10 three-year-olds, and 14 four-year-olds that comprised the original sample of participants. More importantly, only 3 participants who were originally included in the control group were available to obtain post-test data. Thus, it was not possible to make the additional comparison of the treatment versus control group to determine any effect of the intervention. It is important to note that attrition in childcare centers that serve low-income children receiving funding from state subsidies, as is the case with a majority of the children enrolled in the YWCA centers, is typically this high. Families must qualify to retain their benefits every six months. Parents who fail to re-apply, or are no longer working or in training, or who have become over-income, are no longer eligible for the program. For this reason, children are constantly moving in and out of subsidized childcare.

Measures

The Infant and Preschool Mullen Scales of Early Learning (MSEL, Mullen, 1995) was used to assess the children's cognitive/intellectual development and readiness for school. Extensive research has been conducted on the validity and reliability of the Mullen Scales of Early Learning demonstrating that the measure exhibits good internal consistency, test-retest reliability, interscorer reliability, construct validity, and concurrent validity, therefore supporting the use of the instrument for the examination of gross motor and cognitive skills in children (MSEL, Mullen, 1995). The Early Learning Composite score provided by the Mullen is similar to an I.Q. score and provides an

estimate of young children's thinking, reasoning and problem solving abilities. The Mullen (MSEL) is divided into five subscales: (1) gross motor which measures physical development, (2) visual reception which measures how well the child uses visual information, (3) fine motor which focuses on small muscles of the hands used for pre-writing and manipulating objects, (4) receptive language to assess how much the child understands and (5) expressive language or how well the child uses words to communicate. The individual scales within the MSEL can be used to assess strengths and weaknesses in each domain. The components of the test can be sensitive to enhancements such as dance, yoga, and music (see Table I).

Table I

Relationship Between Mullen Scales and Interventions

Measure	Intervention	Sample Behaviors
Mullen/ Overall IQ	Music lessons Yoga Dance	This score is a sum of all the subtests and could include any of the behaviors listed below
Mullen/ Fine Motor	Music lessons	Imitates crayon lines Ability to string beads and/or cut with scissors
Mullen/ Receptive Language	Yoga Music lessons Dance	Recognizes body parts (eyes, nose, mouth, ears, hands, feet, hair) Identifies function of an object (cut with scissors, eat with a spoon)
Mullen/ Expressive Language	Dance Music lessons	Makes verbal analogies (big/little), awake/asleep Uses practical reasoning (i.e. What do you do if your hands are dirty?)
Mullen/ Visual- Reception	Yoga Dance Music lessons	Tracks moving bull's eye 180 degrees Matches by size and colors

Data Collection Procedures

The Mailman Center for Child Development was contracted to assess all children enrolled at the YWCA Centers from 2003 until 2006. Data collection was completed in June 2005. Each child was evaluated using the Mullen Scales of Early Learning (MSEL).

In turn, a database was created to provide a means for targeting children in need of remediation.

For the purposes of this study, access to anonymous data generated from the assessments was granted. The data was analyzed to examine the impact of each type of intervention on the development of children enrolled at a local YWCA Childcare Center.

Results

Data Analysis

A paired samples t-test was performed for each age group in order to analyze the results from the pre- and post assessments for the intervention groups. Specifically, within-group comparisons were conducted to examine whether posttest scores on the dependent measures were significantly higher than pretest scores for each intervention. Furthermore, effect sizes were calculated by subtracting the pretest mean of each dependent variable from the posttest mean and dividing by the average standard deviation. Effect sizes (d) examine the degree that the mean of the difference in scores deviates from standard deviation units. Effect sizes of .2, .5, and .8 are typically considered to be within the small, medium, and large ranges of practical significance (Green & Salkind, 2003).

Dependent variables included the Mullen overall score and the four subscales (visual reception, fine motor, receptive language, expressive language). The Mullen scores obtained from the assessments at the beginning of the school year were compared to those at the end of the school year. This allowed for an examination of whether any significant improvements were revealed as a result of the implementation of the program interventions. Moreover, the effect on involvement in the interventions as a means for

enhancing gross motor skills was unable to be performed as the number of participants at post-test who were administered the outcome measure assessing gross motor skills was too small to analyze the impact of the interventions and provide valid interpretations of any effects that may have been attributed to the various interventions. Aside from attrition and turnover, this was due in part to the fact that the Gross Motor scale can only accurately assess children up to 24 months of age thus further limiting the number of participants who were able to be evaluated on this measure.

Findings

The number of participants in each group, observed pre- and posttest means and standard deviations, effect sizes, and level of significance for all outcome measures are presented in Tables II through IV.

Overall cognitive functioning. Statistically significant gains were not obtained for participants in the creative dance intervention group, $F(1,11) = 2.88$, $p = .118$, $d = 0.43$, the music intervention group, $F(1,9) = 1.091$, $p = .323$, $d = 0.36$, or the yoga intervention group, $F(1,13) = .251$, $p = .625$, $d = 0.12$, on the overall measure of IQ. However, small effect sizes were noted on the overall measure of IQ for children who participated in dance and music.

Visual Reception. No statistically significant differences were obtained from pre-test to post-test for participants in the dance intervention group, $F(1,11) = .178$, $p = .681$, $d = 0.19$, the music intervention group, $F(1,9) = .274$, $p = .613$, $d = 0.2$, or the yoga intervention group, $F(1,13) = .428$, $p = .525$, $d = -0.2$, on the measure assessing visual reception. Although the differences were not large enough to be considered significant, small gains were apparent at post-test for the participants in the two- and three-year-old

age groups. Conversely, a small decline in mean scores was evident at post-test for the 4-year old children who participated in yoga.

Fine Motor. On the measure of fine motor skills, the gains at posttest for participants in the dance intervention group approached significance, $F(1,11) = 2.24$, $p = .163$, $d = 0.54$. Although the difference between the pretest and posttest means was not statistically significant, the effect size was medium. No significant differences were apparent for participants in the music intervention group, $F(1,9) = 2.2$, $p = .172$, $d = 0.44$, or the yoga intervention group, $F(1,12) = .27$, $p = .610$, $d = 0.1$. Although the mean difference from pre-test to post-test was not large enough to support the notion that dance, music, or yoga interventions can enhance a child's fine motor development, it is important to note that treatment gains were apparent for all groups.

Receptive Language. Statistically significant gains on the measure of receptive language was evident for the three-year olds who participated in music interventions, $F(1,9) = 6.85$, $p = 0.28$, $d = 0.82$. The effect size for pretest to posttest gain was large. There were no statistically significant differences between pre-test and post-test scores for participants in the four-year-old age group who were provided with yoga interventions, $F(1,13) = 1.38$, $p = .262$, $d = 0.28$, while the mean scores for the two-year olds who participated in dance remained unchanged, $F(1,11) = .000$, $p = 1.0$, $d = 0$.

Expressive Language. On the measure of expressive language, no significant differences between pre-test and post-test scores were demonstrated for participants in the dance intervention group, $F(1,11) = .88$, $p = .369$, $d = 0.27$, the music intervention group, $F(1,9) = .65$, $p = .442$, $d = -0.36$, or the yoga intervention group, $F(1,13) = .123$, $p = .732$, $d = .08$. Although the differences were not large enough to be considered

clinically meaningful, it is interesting to note that there were gains in mean scores for the two-year-old and four-year-old participants who were provided with dance and yoga interventions, respectively.

Table II

Effect of Dance Intervention on Two-Year-Olds

Outcome Measure	No. of Participants	Pre-test Mean (S.D)	Post-test Mean (S.D)	Effect Size (<i>d</i>)	Significance
Overall IQ	12	94.8 (11.2)	99.7 (11.5)	0.43	.118
Visual Reception	12	50.8 (10.7)	52.7 (9.6)	0.19	.681
Fine Motor	12	48.1 (7.6)	53.7 (13.1)	0.54	.163
Receptive Language	12	43.8 (7.6)	43.8 (6.2)	0	1.00
Expressive Language	12	46.5 (9.8)	48.9 (7.7)	0.27	.369

Table III

Effect of Music Intervention on Three-Year-Olds

Outcome Measure	No. of Participants	Pre-test Mean (S.D)	Post-test Mean (S.D)	Effect Size (<i>d</i>)	Significance
Overall IQ	10	94.7 (16.4)	99.1 (8.0)	0.36	.323
Visual Reception	10	51.2 (10.1)	52.9 (7.0)	0.2	.613
Fine Motor	10	50.2 (17.4)	56.1 (9.5)	0.44	.172
Receptive Language	10	40.2 (5.1)	44.0 (4.1)	0.82	.028*
Expressive Language	10	47.0 (10.1)	44.3 (4.9)	-0.36	.442

Table IV

Effect of Yoga Intervention on Four-Year-Olds

Outcome Measure	No. of Participants	Pre-test Mean (S.D)	Post-test Mean (S.D)	Effect Size (<i>d</i>)	Significance
Overall IQ	14	87.9 (12.6)	89.6 (16.9)	0.12	.625
Visual Reception	14	44.1 (8.1)	42.4 (8.7)	-0.2	.525
Fine Motor	13	46.5 (11.0)	48.1 (10.5)	.01	.610
Receptive Language	14	40.0 (8.8)	42.6 (9.5)	0.28	.262
Expressive Language	14	42.8 (6.7)	43.6 (12.3)	0.08	.732

* Denotes interventions which resulted in statistically significant gains on outcome measures

Discussion

The main objective of the present study was to further investigate the impact of creative arts interventions on various aspects of early childhood development by assessing the effects of music, dance, and yoga in children between the ages of two to five. Specifically, the study was designed to add to the current knowledgebase by examining whether meaningful gains could be made in overall cognitive functioning, visual reception, fine motor skills, receptive language, and expressive language. The existing literature on the use of interventions of the creative arts has provided

contradictory evidence demonstrating their impact on early childhood development. At the current time, researchers and advocates have claimed that enrichment activities such as dance, music, and yoga can provide an array of positive benefits. Specifically, the literature on creative movement/dance in early childhood has been suggested to promote the development of areas such as gross motor skills, creativity, and reading skills, while yoga has been implicated to offer positive contributions to aspects such as intelligence, motor skills, flexibility, balance, posture, and hand-eye coordination. In terms of music, implications have been made regarding the use of musical activities to enhance cognitive development suggesting that they can foster better writing/prereading skills and spatial reasoning skills. Nonetheless, these implications are drawn from a limited number of empirical studies of which a majority demonstrate methodological flaws, utilize relatively small sample sizes, and are based on advocacy reports which are theoretically driven. Furthermore, others fail to control for any extraneous variables which may be related to the implied benefits or provide limited justification on the use of the measures used to examine the impact of the interventions and on how they assess the particular area of concern. As such, it is difficult to determine whether any of the improvements reported were in fact associated with the outcomes observed, thus making it difficult to draw any reliable conclusions from the literature to date.

In light of these issues, this study was designed to expand upon the current literature by controlling for some of the extraneous variables as well as by looking at other areas which have not yet been researched. As such, pretest and posttest measures were collected for all participants using the *Mullen Scales of Early Learning (MSEL)* which is a standardized norm-referenced measure designed to examine all variables of

interest. Based upon the existing literature and the expected relationship between the interventions and areas of development, it was anticipated that children would increase their overall cognitive functioning, visual reception, fine motor, receptive language, and expressive language skills, which are all areas directly measured by the assessment utilized.

Several limitations of this study should be noted as they are felt to have played a major role in the results of this study. First, the small number of participants in each group provided limited statistical power to detect changes that may have resulted from the implementation of the interventions. A larger sample would have increased the study's power to determine smaller effects among the participants in the intervention groups. In addition, the rate of participant dropout did not provide a means for a conclusive analysis to be drawn in terms of the impact that the enhancements may have had on gross motor acquisition. This is important to mention as a majority of the existing literature has suggested that these forms of interventions can provide the experiences needed for children to enhance gross motor skill development. Furthermore, the interventions were only provided during the course of one year. This limitation may have negatively contributed to the findings in that it is possible that the implementation of these types of interventions for a longer duration may be necessary to result in significant improvements. Finally, and of most importance, the lack of a control group of participants who did not receive any form of intervention did not allow for a thorough investigation of the impact that may have potentially been associated to the interventions.

Despite these potential limitations, the current findings demonstrated that meaningful progress can be found in the development of receptive language skills for

children receiving music training. The three-year-old children who participated in the music intervention did seem to improve their receptive language abilities. Thus, findings from this study provide support for the hypothesis that music intervention in three-year-olds can enhance the development of receptive language skills. These findings add to the existing literature suggesting that music intervention can stimulate specific aspects of a child's development (Bilhartz, Bruhn, & Olson, 1999; Gromko & Poorman, 1998; Rauscher, Shaw, Levine, Wright, Dennis, & Newcomb, 1997; Register, 2001; Standley & Hughes, 1997). It is possible that some of the gains can be attributed to the notion that musical experiences can afford children with an opportunity to enhance such aspects of development through learning differences between melodic rhythms, following directions, as well as by listening to and understanding words which comprise the songs. In this study children learnt to use numerous instruments, keep a beat to various rhythms, and follow along with songs. As such, it can be inferred that musical exploration can foster improvements in receptive language skills by providing children with a means to enhance their ability to understand spoken language and conversational terms.

Additionally, despite the fact that gains were only apparent in the area of receptive language for the three-year-old children in the music group, a medium effect size was evident in the fine motor score of children in the dance group, while small effects were apparent on the group's overall IQ and expressive language scores. In addition, small effects were also noted on the measures of overall IQ, visual reception, fine motor, and expressive language for the children who received music as well as the receptive language score for those who participated in yoga. Thus, based on the results from this study, it is possible that offering children creative movement and musical

experiences can potentially lead to general positive outcomes in developmental areas including overall cognitive skills, visual reception, fine motor, receptive language, and expressive language. Conversely, participation in yoga does not appear to provide a great amount of benefit to children in terms of enriching developmental areas apart from slight gains in receptive language.

Nevertheless, it can not be inferred that all forms of early stimulation can provide significant enhancements in early childhood development. The most important element to highlight when interpreting these results is the lack of a control group in this study which limits a complete and accurate analysis regarding the effect of the interventions. That is, although significant gains and small to medium effects were revealed at posttest, without a control group of participants who did not receive any form of enrichment activity it is not possible to make the comparison necessary to ascertain whether the positive gains apparent were a result of the interventions as opposed to normal maturation. Thus, the notion that holistic interventions in early childhood, regardless of type, can enhance cognitive or motor development can not be generalized across varying age groups. Finally, further research is needed in this area to provide more reliable implications on the effects that creative arts interventions can have on early childhood development.

Future Research

There are at least four areas for future research within the area of creative arts interventions. One general area is to investigate whether these forms of interventions would produce a significant amount of improvement when the recipients were compared to a group of individual who did not receive any form of treatment. A second area of

interest is whether these types of enrichment activities would facilitate larger gains if the duration of the interventions were extended. That is, would the amount of improvement revealed be different if the intervention implementation lasted over the course of a one year span? The third area is the extent to which the incorporation of additional components which are directly geared toward enriching the particular variables of interest could in fact contribute to the intervention effects. For example, could the interventions' impact be improved by an additional component designed specifically to enhance certain areas of development so that children could be taught to play musical instruments such as keyboards and guitars which essentially involve fine motor skills? Finally, it would be of interest to examine whether creative arts interventions can foster improvements in areas which were unable to be assessed by this study, such as gross motor skills. This is one area that may be of value as the current literature suggests that dance and yoga, for example, can be used to promote the acquisition of gross motor skills. In addition, with the assumption that dance and yoga utilize abilities associated with gross motor skills, it would be logical to assume that such forms of enrichment activities can provide the stimulation necessary to enhance development in this area.

In conclusion, the results of this study provide some support for the notion that musical training can enhance the receptive language skills in three-year-old children. Furthermore, it is possible that providing such stimulating experiences as dance lessons to two-year-olds and music lessons to three-year-olds can afford them with opportunities that will foster enhancements in areas such as cognitive development, fine motor skills, visual reception abilities, and receptive and expressive language skills. Nevertheless, the limitations in this study make it difficult to draw any reliable conclusions to suggest that

positive gains can result from the implementation of these forms of interventions. Furthermore, the idea that any form of stimulating experience in early childhood can enhance development can not be generalized across age groups. Future research is warranted to determine the impact that creative arts interventions can have on early childhood development.

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