

The Effects of Structured Physical Activity Programs for Gross Motor Development in
Preschoolers.

A Synthesis Project

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Abstract

The purpose of this synthesis was to review the literature on the effects of structured physical activity programs on the gross motor skills of preschooler. It was determined that the benefits of physical education for children in elementary school has been well-documented and include acquiring gross motor skills more rapidly as well as improved cognitive functioning. However, the benefit for preschoolers from organized physical activity or a motor program is not as prevalent in research and discussion. A structured motor program is defined as a motor planning program designed by an expert in Motor Development, Physical Education or Physical Activity. Results indicate that preschoolers who participated in structured physical activity programs scored higher on validated gross motor skill and object control tests than those who did not participate in structured programs. The results also indicated that preschoolers who participated in structured programs demonstrated greater spatial memory, attention performance and cognitive functioning. This synthesis also determined that preschool teachers are not being supported or prepared to teach structured motor programs. Undergraduate programs are not providing classes on motor development or physical activity, schools are not providing the appropriate resources or trainings and the guidelines for physical activity are either not being followed or teachers are unaware they exist.

Chapter 1 – Introduction

Structured physical activity is crucial for preschool students for a variety of reasons including: higher academic achievement, improved gross motor skill development, and improved object control development. Students who develop gross motor skills earlier demonstrate a positive relationship with cognitive development (Veldman, Santos, Jones, Sousa-Sa, and Okely, 2019). This positive relationship is associated with both locomotor and object control skills and can start as young as 3 years old. Students that are able to improve gross motor skills and object control from a young age with a program that lasts as little as six weeks meeting biweekly (Mulvey, Taunton, Pennell and Brian 2018).

However, there are a variety of barriers towards preschoolers being involved in a structured physical activity program. These include teacher preparation, style of instruction and appropriate facilities. A common theme throughout the current research is that early childhood teacher preparation programs are not doing an adequate job providing a framework in motor development and physical activity (Brian, Goodway, Logan and Sutherland, 2017). This is a serious oversight as NASPE, the National Association of Sport and Physical Education, now SHAPE, Society of Health and Physical Education, published guidelines for preschool physical activity and education in 2009 that called for 60 minutes of daily physical activity (NASPE, 2009). Within the research there are two frameworks that seemed to prevail, within the United States the framework is SKIP, Successful Kinesthetic Instruction for Preschoolers (Brian, Goodway, Logan and Sutherland, 2017), and internationally Mastery Motivational Climate (MMC) is the style of instruction preferred (Johnson, Rudisill, Sassi, Wadsworth, and Hastie (2017). Finally, preschool locations are not providing appropriate settings for physical activity to occur (Brian, Pennell, Sacko, Schenkelburg 2018).

Statement of the Problem

It is evident that preschool motor programs have benefitted from structured physical activity programs however, many schools do not currently have a structured physical activity program.

Purpose of the Study

The purpose of this synthesis is to review the literature on the effects of structured physical activity programs on the gross motor skills of preschoolers

Operational Definitions

1. **Preschoolers-** children between the ages of 3 and 5 (Brian, Pennell, Sacko, Schenkelburg, 2018).
2. **Structured Motor Program-** A motor planning program that has been designed by experts in Motor Development, Physical Education and Physical Activity.

Research Questions

1. What are the benefits of structured physical activity programs on the development of gross motor skills of preschoolers
2. What are the barriers to teachers providing more structured physical activity programs

Delimitations

1. All articles were published between 2010 and 2020
2. All articles were peer reviewed
3. All articles examined physical activity in relation to preschoolers

Chapter 2 – Methods

The purpose of this chapter is to review the methods used to synthesize the literature on the effects of structured physical activity programs on the gross motor skills of preschoolers. The studies collected for this synthesis were located using the EBSCO database from The College at Brockport's Drake Library. Within the EBSCO database the following databases were searched: SPORTDiscus and Academic Search Complete. Within these databases a total number of 10 articles met the criteria for inclusion as part of the critical mass within this literature review. In order for an article to meet the criteria for selection in this synthesis it must have been published between 2010-present, this will provide the synthesis with the most up to date and current information available. Other criteria for selection included scholarly and peer reviewed articles that were full-text. Having scholarly and peer reviewed articles provides more validity within the articles and better overall quality. Other articles or sources selected as part of this literature review provided context about the topic, background information and supplemental information to complete the review. All articles and sources are appropriately cited in the reference section of this paper.

In order to gather valuable articles for this synthesis certain keywords and phrases were used when searching the data-base. The first search was "Gross Motor Skill" and "Early Childhood" that resulted in 43 number full-text articles, from the 43 hits 6 were used in the research. That combination of terms was searched first because the term gross motor skill is the basis of the research purpose and question. Early childhood was used because it would cast a wider range prior to narrowing down the search to preschool. The term preschool is American in nature and internationally other terms are used occasionally. Also, longitudinal studies that examine the effects after students leave preschool could be included. On the second search the

terms Gross Motor Skills and Preschool were used. This presented 38 articles and from those 38 a single article was selected. From this single article a second framework was presented and the author of that framework had two articles referenced. Those two articles were then used as the next two included in the literature review. For the final article the author's last name, Brian, and the term preschool were searched and 3 new articles were yielded. From those 3 the final article was selected.

Articles that were selected for use in this synthesis were scholarly and peer reviewed articles that were full-text. Also, when selecting articles for use in this synthesis it was important that each article selected had valuable information related to the effects of structured physical activity programs on gross motor skill development in preschoolers.

Specific criteria were used in order to be a part of the literature review. All of the articles selected were based on the effects of structured physical activity programs on gross motor skill development in preschoolers. Participants in the studies reviewed were students aged 3-5, both male and female. Early Childhood teachers, male and female, were also both participants in studies reviewed.

For this synthesis a total number of 10 articles were used to compile data on the topic of effects of structured physical activity programs gross motor skill development of preschoolers. Articles came from a variety of journals including Early Human Development, Early Child Development and Care, Early Childhood Education, Journal of Science and Medicine in Sport, Research Quarterly for Exercise and Sport, European Journal of Physical Education and Sport Science, Journal of Sport and Exercise Psychology, Physical Education and Sport Pedagogy, and the Journal of Motor Learning and Development.

The critical mass for this synthesis is comprised of 1,443 preschoolers, 20 undergraduate students studying early childhood education, and 17 preschool teachers. Within the 10 articles used for the literature review the age of preschoolers examined was between 3 and 5 years old. The range of educators was from 25 years old up to 70 years old. The articles that examined the effects of a structured physical activity program analyzed the effects between a control group and intervention group, these groups were constructed regardless of gender or age.

Data were analyzed using the following methodologies for the studies under review. Data was frequently compared between two groups and done so using either an ANCOVA, ANOVA, *t*-tests or SPSS. To collect the data to analyze the TGMD-2 and TGMD-3 were the most commonly used form of testing to compute the scores for object control and locomotor skills. When examining teacher preparedness and effectiveness a teacher fidelity check sheet was used to compute scores.

Chapter 3

Review of Literature

The purpose of this chapter is to review literature regarding the effects of structured physical activity programs on the gross motor skills of preschoolers. These articles have been categorized based on the type of study conducted, setting and/or participants of the study, and the main focus of the research. Specifically, the following topics will be presented: benefits of physical activity for preschoolers, analyzing two types of programming, Mastery Motivational Climate (MMC) and Successful Kinesthetic Instruction for Preschoolers (SKIP) as well as teacher preparedness to teach structured physical activity.

Benefits of Physical Activity for Preschoolers

The benefits of physical activity for preschoolers is separated into two major discussion points, academic achievement and development of locomotor skills. Academic achievement was examined to determine if more physical activity led to an increase in cognitive functioning. While locomotor skill development was examined to determine if structured physical activity programs increased the development of locomotor skills compared to no physical activity or unstructured physical activity.

Neiderer et al., (2011) examined the relationship of aerobic fitness and motor skills with memory and attention in preschoolers. The study consisted of 245 preschoolers who were tested on aerobic fitness, agility and dynamic balance as well as their memory and attention. Participants were assessed using a shuttle run test, an obstacle course and a balance beam for the physical portion of the assessment. Cognitively they were assessed using a validated sub test from IDS, Intelligence and Development Scales, for spatial memory and a validated Konzentrations-Handlungsverfahren für Vorschulkinder (KHV-VK) for attention performance.

Data was then analyzed using Stata version 11.0 and tested with two tails at a significance level of 0.05. The results supported the researcher's hypothesis that higher aerobic fitness and motor skills would lead to higher scores in working memory and attention. The results also demonstrated that future improvements were higher in participants with higher fitness scores. These results suggest that exercises that involve mental processing that include executive functioning are recommended to trigger cognitive development in preschoolers. Finally, the researchers suggest that nine months may be too short of a time to fully determine the effects and recommended a longer longitudinal study.

Draper et al., (2012) also examined the benefits of physical activity on cognitive development on preschoolers. However, in this study the researchers used a motor programming curriculum for their participants. In this study there were 118 participants who were preschoolers from disadvantaged settings. The participants had organized settings once a week for 45-60 minutes where the motor programming curriculum was instructed. The control group continued with their typical motor activities. The participants from both groups were assessed using the TGMD-2 for the gross motor skill component and the Herbs Early Childhood Development Criteria test for cognitive functioning and analyzed using Statistica Version 7. A t-test was used to analyze total locomotor and total object control scores then evaluated using ANOVA. Through this analysis the researchers determined that the group exposed to the motor programming curriculum had significantly better scores for locomotor and object control. The students in the control group also demonstrated significant improvements in cognitive scoring. This study demonstrated that even a short period of organized physical activity had significant benefits towards improvements in gross motor skills and cognitive functioning for preschoolers from disadvantaged economic settings.

Robinson et al., (2012) used a two-tiered study that relates to both benefits of physical activity and teacher preparation. In the study the researchers hoped to determine if early childhood majors could be taught to implement a structured curriculum to promote motor skill development in preschoolers. In this study there were 20 participants that were undergraduate students and 11 preschool students who participated in the program created. For the preschoolers, an 11-week movement program was implemented by the undergraduate students. This program was twice per week, for 11 weeks and each session lasted 30 minutes. During the session students were videotaped for data collection and the data was analyzed at a later time using the TGMD-2. Three paired sample T-tests were conducted to determine pre and post intervention changes in motor skills. The study demonstrated that the students demonstrated significant improvement in performance skills and locomotor skills because of implementing the organized motor curriculum. It also demonstrated that with proper training early childhood undergraduate students can successfully design and implement a structured motor program. This study provided a conceptual framework for future research that examines the benefits and recommendations for how to organize a training program for undergraduates to increase knowledge of motor programming.

Teacher Preparedness

Although Robinson et al., touches on teacher preparedness it was not the major focus of research and findings and thus was included above. The first study that the major findings and discussion focuses on teacher preparedness used was Hardy et al., (2010). In this study they sought to describe the socio-demographic distribution of functional movement skills (FMS) and describe the performance criteria for the FMS. Parents were sent a survey for their demographic information to determine the socio-demographic status. After that the eight FMS, run, gallop,

hop, broad jump, striking a stationary ball, catching, kicking and overhand throws were assessed. There were 412 preschool participants assessed on their FMS. The students FMS were analyzed using the TGMD-2 and analyzed using SPSS. The study determined that only the run was mastered by 75% of participants of the 8 FMS skills and the other skills were mastered by less than 35% of the preschoolers. Because of these findings the researchers provided recommendations for increasing teacher preparedness. These included practical and training recommendations. The practical recommendations were highlighted by teachers giving skill demonstrations and practice time for students as well as more equipment and dedicated spaces for skill development. The researchers recommended that teachers received more resources for motor skill development as well as professional development.

Brian et al., (2017) executed research that examined to what extent Head Start teachers who delivered an 8-week SKIP (Successful Kinesthetic Instruction for Preschoolers) elicited learning of object control skills for preschoolers. This study used 5 Head Start teachers who went through a 3-hour training module and had to demonstrate 85% on exams as well as a 2-live simulation training before being included in this study. The teachers delivered the SKIP curriculum for 8 weeks and 450 minutes total to 122 preschoolers. The preschoolers were assessed pre and post on object control skills using the TGMD-2. The scores for object control were analyzed using 2-level-HLM testing the effectiveness of the teacher's fidelity. Teachers were assessed using a teacher fidelity checklist. The results of this study showed positive significant pre and post test scores in object control. Most teachers reached the targeted 50% target validity score. 63% of teachers reached level 1, which included basic PE skills, and appropriate feedback. 37% reached level 2 which indicated higher level demonstration of PE skills. This is significant because it demonstrated that even a 5-hour training for teachers with no

experience in physical education or motor development would allow for implementation of a structured motor program that facilitated significant growth in student success.

Brian et al., (2018) examined preschool teacher awareness of Active Start Guidelines (ASG) for Physical Activity. As well as how well prepared these teachers felt they were to follow the guidelines and self-perceptions of their own physical capabilities. 102 preschool teachers, 14 males and 88 females in South Carolina completed a 10 question survey about the guidelines for physical activity and then self-responded to questionnaires about their own fitness. The survey was administered by research assistants face-to-face. This data was then compiled and calculated using Microsoft Excel. Based on the survey the researchers found data that determined the majority of teachers were not trained to deliver physical education or structured physical activity. 88% of teachers had no formal background or training in motor development. 77% were unaware of the active start guidelines and 92% did not provide daily teacher-led motor programming. Although 47% provided at least 60 minutes of free play. Just about half, 54%, had access to outdoor space and less than half 46% reported having access to indoor and outdoor activity space. Finally 24% reported having no access to activity space and not a single participant reported having an employed physical education teacher or physical activity expert at their school. The research demonstrated that with the lack of formal training it is not surprising that preschool teachers are not providing appropriate physical activity for their students. Their lack of knowledge for what is required and recommended is not just at the classroom level but the researchers reported that unstructured physical activity is not a written policy in all preschools in South Carolina.

Types of Structured Physical Activity Programs

During research conducted for this synthesis two distinct structured physical activity programs arose. Mastery Motivational Climate Intervention (MMC) and Successful Kinesthetic Instruction for Preschoolers (SKIP) continually arose in literature. MMC is based on the achievement goal theory the idea of completing a task for the purpose of learning not for completion of the task (Johnson et al., pg 517-518, 2019). While SKIP is based around motor development and preschool specific skill development strategies (Brian et al., pg. 481, 2017).

Mastery Motivational Climate (MMC) Intervention

Johnson et al., (2019) wanted to determine the effects of implementing a 9-month MMC intervention for physical education for preschool children and how it affected their functional motor skill (FMS) development. In this study 96 preschoolers participated who were identified as low socio-economic-status and/or at-risk for developmental delays. 58 of these students were in the MMC-program while the remaining 38 students were the control and continued their normal program. The TGMD-3 was used pre and posttest for both groups and the score was determined by two coders. All of the videos were coded following completion of the 9-month intervention. The data was then analyzed using MANOVA. This study showed that at pre-test there were no significant differences between the groups for both locomotor skills and ball skills. However, by the post-test there were significant differences in both locomotor and ball skills. This was the first study to focus solely on comparing the effectiveness of a MMC style structured program compared to a typical free-play curriculum. This clearly demonstrated the benefit of a structured program for development of both locomotor and ball skills.

Johnson et al., (2017) examined how teacher behaviors effected motor skill performance within an MMC program. In this study the researchers examined behaviors such as explicit

instruction and feedback. 99 preschool students from the Southeastern USA who were mostly African-American and lower socioeconomic status. These students were assessed pre and post-test based on skills from the TGMD-3. The students were divided into four groups, one focused on motor skills, one of physical activity, one on both physical activity and motor skills and finally one group focused on free play. A single researcher did all of the coding for TGMD-3 test assessments and an ANCOVA was run to determine significance of data. The research showed that the group focused on motor skills scored significantly higher than the other groups. The physical activity group scored significantly higher than the control, free play, group. These results were consistent for locomotor and object control skills. This study again supported the hypothesis that a structured physical activity program, this case MMC, led to higher success in development of physical activity skills. This study also determined that greater growth occurs when cues and feedback are used as opposed to unstructured free play. Finally, this study determined that simply setting up an area and curriculum in the MMC format was not sufficient, teachers had to be trained on appropriate cues and how to give proper feedback.

Successful Kinesthetic Instruction for Preschoolers (SKIP)

Mulvey et al., (2018) examined whether using a gross motor intervention program (SKIP) not only led to improved motor skills but gains in executive functioning in preschoolers. 107 preschool students in the Southeastern USA were participants and primarily the participants came from low socioeconomic status. Participants were divided into two groups, a control and an intervention. The control group did free play 5 days a week for 30 minutes per session. The intervention had 2 days of SKIP programming and 3 days of free play 5 days a week. All of the participants were assessed using the Heads, Toes, Knees, Shoulder (HTKS) assessment as well as the TGMD-2. HTKS measures behavior regulation and executive functioning. The results

were analyzed using SPSS and t-tests. The results demonstrated that students in SKIP improved in object control skills and gross motor skills and had significantly higher post test executive functioning than the control group. This is important because prior to the intervention there was no difference in executive functioning. The researchers were able to demonstrate that not only does SKIP positively impact motor skill development, but is beneficial to executive functioning.

Brian et al., (2017) hoped to examine the effects of a 6-week SKIP program led by the preschool teachers on their student's learning of object control skills. This study also sought to examine the ability of preschool teachers to implement the SKIP curriculum. This study took place on a college campus' early childhood center in the Midwest USA. There were two teachers who participated and 57 preschool students. The TGMD-2 was administered pre and post intervention to determine effectiveness of SKIP programming. A teacher fidelity checklist was used to determine teacher effectiveness. The data was analyzed using a 2-level hierarchical linear model (HLM) to examine the effectiveness of the teacher on students growth in object control skills. The second HLM was used to compare fidelity of teachers on students object control skills. Students in the intervention group, those who received SKIP programming, scored significantly higher than the control group in relation to object control skills. The study also determined that as the teacher fidelity grew it led to the increase in the object control scores for their students. This study is significant because it demonstrated that with appropriate training, teachers were able to implement SKIP into their curriculum. By implementing SKIP their students demonstrated significantly higher object control skills than by using the free-play model they had previously implemented.

Summary

The purpose of this chapter was to review literature regarding the effects of structured physical activity programs on the gross motor skills of preschoolers. Specifically, the benefits of physical activity for preschoolers, the impact of teacher preparedness, and analyzing two specific structured physical activity programs, MMC and SKIP. The research reviewed gave insight for the future of the benefits of implementing structured physical activity programs for the preschooler's gross motor skills.

Chapter 4

Results, Discussion and Recommendations for Future Research

The purpose of this chapter is to present the results of the review of literature on the effects of structured physical activity programs on the gross motor skills of preschoolers and how these results align with the purported research questions which guided this synthesis project. In addition, recommendations for future research as it relates to structured physical activity programs on the development of gross motor skills in preschoolers are presented.

The results of this review of literature revealed that structured physical activity programs benefited development of locomotor skills as well as an increase in academic achievement. Preschoolers who were in structured physical activity time for as little as 2, 30 minute sessions a week demonstrated higher validated motor skill scores than students who participated in free play time. Preschoolers with structured physical activity time also demonstrated higher spatial memory, attention and cognitive functioning.

This review of literature also outlined barriers to the implementation of providing these structured physical activity programs. These included; teacher preparedness from undergraduate training, lack of resources and professional development for teachers, and the lack of policy present within preschools. A common finding when examining why programs were not implemented from the review of literature was that undergraduate programs are not providing classes on motor development or physical education to future preschool teachers. This is then compounded by the schools lack of resources and professional development on implementing a structured physical activity program or motor development. Finally, the literature revealed that preschool teachers were unaware of state recommendations for physical activity.

Discussion

Interpretations

As part of this literature review, several research questions were posed. The first research question examined was, what are the benefits of structured physical activity programs on the development of gross motor skills of preschoolers. The results in many of the research studies show that there is a positive relationship between structured physical activity programs and development of gross motor skills. For example, Johnson et. Al (2019) found that students in a structured physical activity program after 9 months increased their locomotor TGMD-3 scores by 16.4 points for the group mean. Compared to only 8.7 for the control group over the same time period. Johnson also determined that object control skills went up 18.7 for the group mean in the structured program compared to 5.5 points for the control group. However, the benefits found were not just psychomotor, as cognitive function was found to improve also. Drapper et. Al (2012) determined this using the Herbst Early Childhood Development Criteria test. In their study after 8 months they were able to demonstrate the cognitive benefit of a structured physical activity program. Students in the intervention scored as follows; Very Low 24%, Low 20%, Normal 29%, High 14%, Very High 12%. Students in the control group scored as follows; Very Low 49%, Low 22%, Normal 18%, High 6%, Very High 6%. This data demonstrates that in the intervention there were fewer very low and low scores and more high and very high scores, thus demonstrating the benefit of a structured physical activity program on cognitive development.

The second research question examined was, what are the barriers to teachers providing more structured physical activity programs? The results shown throughout the study relay three major barriers. Teachers who are underprepared from their schooling, lack of resources and trainings from the schools, and lack of knowledge of state regulations or recommendations.

Brian et. Al (2018) found that 88% of the 102 teachers surveyed had no formal background or training in motor development, physical education or physical activity. It is unreasonable to expect teachers with no training in their schooling to effectively implement a structured physical activity program, unless they are being provided appropriate resources or trainings. In that study it was also found that of the 102 teachers not a single one in their preschool employed a physical education teacher or physical activity expert, and Brian et. Al (2017) determined that using a 3-hour training module combined with a 2-hour live simulation preschool teachers could reach a target validity teaching score for basic PE skills, feedback and cues 63% of the time. Finally, Brian et. Al (2018) reported that of the 102 preschool teachers surveyed 77% were unaware of the Active Start Guidelines for preschool physical activity, 92% did not provide daily teacher-led motor programming, 47% did not provide at least 60 minutes of daily active play time, and 24% had no access to a safe location for physical activity. Not only are preschool teachers not aware of the guidelines for proper activity, but the vast majority surveyed are not providing students with a guided program to improve motor skills. Further, almost a quarter of the teachers interviewed did not have a safe location to promote physical activity even if they were aware of the guidelines to help reduce the almost half of teachers who did not provide an hour, minimum, of active playtime.

Implications

When it comes to previous research done on the effects of structured physical activity programs on the gross motor skills of preschoolers there seems to be agreement upon the value of a structured program. Researchers seem to come up with similar conclusions on how structured programming benefits the development of gross motor skills in preschoolers. Based on the research gathered it can also be determined that there is cognitive development that occurs

because of physical activity. As preschool teachers, administrators, and parents become knowledgeable about the benefits of not just physical activity but the extended benefits of a structured program more schools should implement a program. It is critical that all three stakeholders above are knowledgeable about this. For parents if they know this information they can start to demand from their current program a structured physical activity program or change the program their preschooler is in. As more parents demand this, and students leave schools teachers and administrators will be forced to adapt.

As stakeholders transition they will realize, as the data in this synthesis shows, there are two major programs that exist in current research. These are the Mastery Motivational Climate (MMC) and the Successful Kinesthetic Instruction for Preschoolers (SKIP). MMC throughout the research, was the program most frequently found in international studies, while SKIP was the program of choice domestically. Although these two programs differ slightly, results were similar when compared to an existing control of free play. Both programs demonstrated increased gross motor skill and cognitive development in preschool students.

As research continues to develop on the benefits of structured physical activity, the three stakeholders above will continue to feel pressure to respond. As the stakeholders are further educated on the importance of a structured physical activity program their rise in prevalence will increase. Further, as more preschools implement these programs it will require undergraduate preparatory programs to include this in their knowledge base for future educators. Finally, as more schools implement these programs it will create more job opportunities within physical education and give rise to a newer specialty, early childhood.

Recommendations for Future Research

In reviewing the data base on the effects of a structured physical activity program on the gross motor skills in preschoolers, the following limitations were noted regarding the studies under review. Lack of longitudinal studies examining the effects over extended periods of time and development. Limited sample size geographically within the studies, few researchers currently are examining this phenomenon. This led to a narrow author base that conducted research in a narrow geographic area. The limit of geographic area is inclusive of analysis of program implementation as well as teacher preparedness. Finally, my limited variety of researchers impacted the types of programs I was able to uncover.

Based on these limitations and other insights related to the literature the following recommendations for future research should be considered:

1. Implementation of longitudinal studies on the effects of structured physical activity programs on gross motor development
2. Further research on the benefits of structured physical activity programs in new geographic locations
3. Further research comparing effectiveness of specific structured physical activity programs.

Summary

Overall Summary

The purpose of this literature review was to determine the effect of structured physical activity programs on the gross motor skills of preschoolers. Delimiting variables were used to do an exhaustive data-based search which ultimately yielded to 10 articles that were chosen for this

review. These articles were then systematically used to determine the effects of structured physical activity programs on the gross motor skills of preschoolers.

Research revealed that by implementing a structured physical activity program, preschoolers will develop gross motor skills more rapidly than if provided free activity time. With this in mind, as motor skills develop it was shown that implementation of a structured physical activity program led to more development cognitively in preschoolers as well. Unfortunately, research revealed three major barriers to successful implementation of structured physical activity programs. Teacher preparation programs are not adequately preparing students in motor development or physical education. Schools are not providing the appropriate resources or professional development trainings. Finally, teachers and schools are unaware or not following activity guidelines for preschoolers.

However, as more research comes to light the benefits of structured physical activity programs will push towards greater implementation. Within the research found, it showed an increase in implementation as teachers were successfully trained to implement these programs to determine the effects. As more stakeholders become aware of these benefits, hopefully the number of preschools that include structured physical activity programs in their curriculum increases

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Appendix A

Author	Title	Source	Purpose	Methods & Procedures	Analysis	Findings	Discussion/ Recommendations Research Notes – Commonalities/Differences
Neiderer, Kriemler, Gut, Hartmann, Schindler, Barral & Puder	Relationship of aerobic fitness and motor skills with memory and attention in preschoolers (Ballabeina): A cross-sectional and longitudinal study. (2011)	BMC Pediatrics	Higher aerobic fitness and better motor skills in young children would be related to better memory and attention at baseline and more improvements over 9 months	N=245 Preschoolers Tested aerobic fitness, agility and dynamic balance for 45-50 minutes For spatial memory took a validated subtest from Intelligence and Development Scales (IDS) To measure attention performance a validated Konzentrations- Handlungsverfahren für Vorschulkinder (KHV-VK) was used	Stata version 11 used Testing two-tailed and at significance level of 0.05	Aerobic fitness and motor skill positively associated with working memory and attention, as well as future improvements	9 months potentially too short a time High fitness in Preschoolers leads to high attention in future Relationship between dynamic balance and working memory Exercises that involve mental processing including executive functioning are recommended to trigger cognitive development

Drapper, Achmat, Forbes & Lambert	Impact of a community-based programme for motor development on gross motor skills and cognitive function in preschool children from disadvantaged settings (2012)	Early Child Development and Care	Assess impact of Little Champs program for motor development on GMS and cognitive function	118 children tested using TGMD 2 3-4 times a week sessions conducted with children using Little Champs	Statistica Version 7, t-test used Total locomotor and object control scores logged and evaluated using ANOVA	Students exposed to 8 months of program had significantly better scores for locomotor and object control compared to control group Significant improvement in cognitive scores also compared to control Even limited exposure to a low intensity program can positively impact GMS	Shows that organized program for Early Childhood beneficial Intervention Group's mean locomotor score was 43.9 which is a standard score for a child about 9.5 years old and their mean age was 4.6
Robinson, Webster, Logan, Lucas & Barber	Teaching Practices that Promote Motor Skills in Early Childhood Settings (2012)	Early Childhood Education	Determine if early childhood majors could successfully be taught to implement an instructional approach to promote	20 UG designed and implemented a movement program 14 Pre-Kers participated in an 11-week program 2 sessions per week for 30 minutes a session	Students assessed with TGMD 2 Three paired sample T-tests conducted to determine pre and post	Significant improvement in total performance and locomotor skills With guidance and training Early	Demonstrates the importance of movement program Provides a conceptual framework and recommendations for implementing a movement program

			motor skill development	Students videotaped during data collection Students had no disabilities	intervention changes	Childhood majors can design and implement a movement program Demonstrates need and value for UG to receive training in movement programs	Training is required to implement an effective program No recording or testing on effectiveness of training program for UG Used a “mastery program” for motor development
Hardy, King, Farrell, Macniven & Howlet	Fundamental Movement Skills among Australian Preschool Children (2010)	Journal of Science and Medicine in Sport	Describe the prevalence and socio-demographic distribution of functional movement skills (FMS) Describe the performance criteria of each skill among 4-year-olds	Survey by parents first for demographic info 8 FMS assessed (run, gallop, hop, broad jump, striking stationary ball, catch, kick, overhand throw) Children tested in groups with one assessor per child 412 children assessed	TGMD 2 used to assess Analyzed using SPSS	Results for ages 4-4.9 years only presented Run was mastered by ¾ while all over skills below 35%	Discussion on differences between Gender and SES Advocates for fun, inclusive and skill-based games Give practical implications: Teachers and parents need to demonstrate each skill and allow practice time Teachers need resources and Pro Dev. Need dedicated spaces and equipment to develop skills
Johnson, Rudisill, Hastie, Wadsworth, Strunk,	Changes in Fundamental Motor-Skill Performance Following a	Research Quarterly for Exercise and Sport	Determine the effects of a 9-month (one school year) mastery	180 pre-k students serves children with Low SES and at-risk for	TGMD 3 Only two coders	No significant differences between MMC and CG at pretest	Results show that growth in FMS is more beneficial in a structured program (MMC)

Venezia, Sassi, Morris & Merritt	Nine-Month Mastery Motivational Climate Intervention (2019)		motivational climate physical education program for preschool children on their FMS learning.	developmental delays 6 classes (n=58) participated in MMC-program while the other 5 classes (n=38) continued normal protocol	All videos coded after post-test Inter-rater reliability was 92% agreement with the 3 rd independent rather doing 20% MANOVA	for LM or BS skill Post-test significant difference in LM and BS	First to show benefit of MMC compared to typical plan
Johnson, Rudisill, Sassi, Wadsworth, Hastie	Instruction Matters: Influence of Instruction on Motor Skill Learning Across Different Mastery Motivational Climate Conditions (2017)	European Journal of Physical Education and Sport Science	The purpose of this study was to examine the effects of different teacher behaviors (i.e., explicit instruction and feedback) within mastery climates on motor skill performance.	N=99 all Pre-K (ages 3-5) SE USA mostly African-American and lower SES Pretest and post experimental design Biweekly for 7 weeks Based on skills in TGMD-3 and other skills One group focused on motor skills, one on Physical activity, one that did both and one group did free play	Motor skills assessed using TGMD-3 Single researcher did all coding ANCOVA run to determine significance	Motor skill focused groups scored significantly higher than other two groups PA group significantly higher than Free play (control) group Same results for object control scores	Greater growth when focusing on cues and feedback as opposed to activity and free play Students benefit when teachers reinforce cues and provide feedback Simply setting up an area and curriculum to meet MMC style isn't sufficient teachers need to know cues and how to give appropriate feedback
Mulvey, Taunton,	Head, Toes, Knees, SKIP! Improving	Journal of Sport and	The aim of the current study was to	N=107 between ages 3 and 6 SE USA	Analyzed with SPSS and t-tests	Students in SKIP (Successful	Shows that SKIP positively impacts gross motor skill development as well as

Pennell, & Brian	Preschool Children's Executive Function Through a Motor Competence Intervention (2018)	Exercise Psychology	test whether a gross motor intervention also led to gains in executive function.	Primarily low SES Assessed all students pre and post in Heads, Toes, Knees Shoulder (HTKS)assessment and TGMD-2 Students in Intervention biweekly over 6 weeks for 30 minutes per session then freeplay other 3 days Control did freeplay all 5 days HTKS=measures behavioral regulation, measure of executive function		Kinesthetic Instruction for Preschoolers) improved compared to no improvement for control in TGMD Students in SKIP had significantly higher posttest executive scores than control, whereas before there was no difference in pretest	executive functioning scores
Brian, Goodway, Logan, Sutherland	SKIPing with teachers: an early years motor skill intervention. (2017)	Physical Education and Sport Pedagogy	purpose of this study was to investigate the effects of a six-week SKIP program taught by early	Dynamical Systems Theory (DST) of motor development Took place at an early childhood center on campus in Midwest USA Teachers in study =2	2-level Hierarchical Linear Model (HLM) examined effectiveness of teacher on students	SKIP students significantly higher than control in OC Strong support for SKIP in growth of OC	Teachers failed to deliver SKIP adequately during the first two lessons (Table 1). Informal observations during the first two lessons revealed that teachers initially struggled to provide congruent feedback, give proper

			<p>childhood teachers on their students' learning of OC skills. In order to contextualize student learning in OC skills, a secondary purpose was to examine the extent to which early childhood teachers could implement the SKIP program with fidelity and how instructional fidelity influenced OC improvement in the SKIP condition.</p>	<p>N=57 Pre-K students Pre and post test experimental quasi design TGMD-2 LP fidelity check sheet SKIP programming 2x a week, usual programming 3x</p>	<p>growth of OC 2nd HLM on fidelity of teachers on students OC skills</p>	<p>Teacher fidelity in using SKIP significant in increase of OC score in students</p>	<p>demonstrations, set up progressions correctly, and implement SKIP with appropriate pacing. After the weekly briefing of the following week's lessons, SKIP teachers were able to improve their lesson plan fidelity SKIP is able to be integrated with support and coaching</p>
Brian, Goodway,	SKIPing With Head Start	Research Quarterly for	This study examined the	Head Start teachers N=5 deliver T-	2 level HLM testing	2 level HLM showed	Teachers went through a 3-hour training module and

Logan, & Sutherland	Teachers: Influence of T-SKIP on Object-Control Skills. (2017)	Exercise & Sport	extent to which Head Start teachers delivering an 8-week teacher-led SKIP (T-SKIP) intervention elicited learning of OC skills for Head Start children.	SKIP for 8 weeks for 450 minutes total N=122 children from low SES pre and post tested on OC in TGMD 2	effectiveness of teacher fidelity	significant differences in T-Skip students and control	had to demonstrate 85% on all exams to move on. Then did a 2 hour live hands-on simulation style training Received an LP fidelity check-sheet, LPs and all other needed materials Teachers almost reached target validity score of 50% in Fidelity Reached level 1 (basic PE skills, feedback, etc) 63% level 2 (37%) strong results when none of the teachers had experience in UG with PE and Motor Development
Brian, Pennell, Sacko, Schenkelburg	Preschool Teachers' Preparedness for Knowing, Enabling, and Meeting the Active Start Guidelines for Physical Activity. (2018)	Journal of Motor Learning and Development	the purpose of this study was descriptive in nature as we aimed to gain understanding regarding South Carolina preschool teachers' self-reported awareness of the ASG, preparation	N=102 Pre-k teachers in SC M=14, F= 88 Completed a 10 question survey regarding guidelines for PA Self-responded to questionnaire about self-fitness	Research Assistants met and delivered assessments face-to-face Data compiled and calculated in Excel	88% had no formal background or training in motor development or PE/PA 77% unaware of the ASGs 92% didn't provide daily teacher-led motor programming	Most of sample had no formal coursework in PE/PA Because of lack of training not surprising lack of knowledge of ASGs With lack of knowledge leads to lack of participation for youth Unstructured PA not a written policy in all schools

			<p>for adherence to the ASGs, actual adherence to the ASGs, and their self-perceptions of their own movement capabilities. (ASG= active start guidelines)</p>			<p>47% provided at least 60 mins of free play 54% had access to outdoor space 46% had access to indoor and outdoor space 24% had no access to space 0% had an employed PE teacher or PA expert</p>	
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