

## A Yoga Program for Preschool Children in Head Start and Early Intervention: A Feasibility Study

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### Abstract

**Background:** Yoga may be an effective method to promote physical fitness, motor skills, strength, and attention to task, mindfulness and stress reduction in children. However, evidence is limited on the feasibility of conducting yoga programs for preschool children in integrated preschools (Early Intervention and Head Start). The purpose of this study is to examine the feasibility and acceptance of a yoga program in an integrated preschool. All pre-schoolers in this study have or are at risk for developmental delay or disability.

**Methods:** Seventy one (71) pre-schoolers aged 3-5 years participated in a 5 week yoga program. (2 sessions/week). Thirty-nine (39) pre-schoolers participated in pre and post gross motor measures. Teachers completed pre and post Devereux Early Childhood Assessment Clinical Form (DECA-C) to examine pre-schoolers behavioural concerns. Teachers provided anecdotal feedback on the feasibility and acceptance of the yoga program in the preschool setting.

**Results:** The pre-schoolers improved on two of the five gross motor tests (Stepping Sideways over a Balance Beam:  $z=-3.34$ ,  $p=0.001$  and Sit-to-Stand ( $z=-4.29$ ,  $p=0.001$ ). One significant finding was observed for DECA-C Behavioural Control ( $z=-2.59$ ,  $p=0.010$ ).

**Conclusion:** A yoga program may be feasible in the integrated preschools to promote gross motor skills. However, the DECA-C findings indicated that behavioural control (attention, focus, emotions) decreased suggesting that the yoga program may need to be revised to include more social, behavioural and interactive activities. Teachers indicated that students were eager and that they showed improved attention with better transitions among classroom activities.

**Keywords:** Yoga; Preschool; Motor skills; Behavioural concerns

### Introduction

Yoga is a form of complementary and alternative medicine (CAM) that has become popular in the United States in recent years for the treatment of a variety of health conditions for adult and paediatric populations [1,2]. Yoga is a mind-body practice to promote and maintain health and well-being that originated in India more than 2000 years ago [1]. There are several different forms or schools of yoga. 'Hatha yoga' is popular in Western cultures and includes postural exercises (asanas), breath control (pranayams) and meditation (dhyana) to promote health, fitness and well-being [1-3].

In the paediatric population, yoga has been used to improve physical fitness, motor skills, strength, negative behaviours, attention to task, mindfulness and to reduce stress in older children (those in elementary school through high school) with typical development and those with physiological disorders and behavioural and developmental conditions [1-7]. Evidence suggests that yoga programs may be effective in promoting health and improved behaviours in children with or at risk for developmental delay or disability in school settings [8-10]. Findings indicate that yoga for children may improve motor skills, social-emotional regulation, impulsivity, and focus and memory in the classroom [1,3,10]. Furthermore, yoga programs provide creative strategies for school-based physical and occupational therapists to promote physical activity and social participation [11-13].

Although yoga has the potential to be a fun and effective strategy to increase fitness and function in school-based settings, the evidence is limited by the research quality in studies with older children and

the evidence is even more limited for pre-schoolers [13,14]. Evidence from a quasi-experimental study suggested that pre-schoolers with and without disabilities showed no significant change but trends were identified for improved behaviour and fine and gross motor skills after a 4 week yoga program [15]. Evidence from a study to compare motor skills in pre-schoolers with typical development in a group comparison (yoga versus a control group) resulted in significant improvement in static balance ( $d=1.52$ ) and functional lower extremity strength ( $d=0.82$ ) [14].

Preschool aged children (3-5 years old) at risk for disabilities or developmental delay may participate in center-based Head Start programs to promote school readiness. Pre-schoolers with documented disabilities or delays often participate in Early Intervention (EI) programs in which they have Individualized Education Programs (IEPs) to identify the special education and therapy services (physical, occupational and/or speech therapy) they may need to promote

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Received March 24, 2015; Accepted April 13, 2016; Published April 20, 2016

**Citation:** O'Neil ME, Ideishi RI, Benedetto M, Ideishi SK, Fragala-Pinkham M (2016) A Yoga Program for Preschool Children in Head Start and Early Intervention: A Feasibility Study. J Yoga Phys Ther 6: 238. doi:10.4172/2157-7595.1000238

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development and learning. Yoga may present occasions to promote skill development through multidisciplinary, community-based approaches which include physical and occupational therapy and other disciplines (i.e., art, music, and dance) [11]. These programs offer opportunities for pre-schoolers to develop skills across multiple areas (i.e., sensory, motor, cognitive, language, social and emotional) and they may provide opportunities for inclusive experiences in which children with typical development and those with or at risk for delay participate together for increased socialization and learning [12,13,16-18]. Finally, for physical and occupational therapy purposes, yoga programs may provide a viable strategy for group sessions so that children with disabilities or learning challenges who are in EI programs can achieve their IEP goals using fun, inclusive (with children in Head Start) and efficient strategies [12].

The purpose of this study is to examine the feasibility and acceptance of a yoga program in an integrated preschool setting in which young children are enrolled in Head Start or EI. Therefore, all preschoolers in this study have or are at risk for developmental delay or disability. Feasibility was determined by examining child and program evaluation outcomes.

## Methods

### Participants

A total of 71 children with an average age of 4.85 years (SD=8 months) enrolled in a yoga program during the summer school program of an inclusive, urban preschool. Most of the children were boys (n=40, 67.3%) and the majority (71.8%, n= 51) attended the school as part of a Head Start Program whereas 20 children (28.2%) had special needs and were enrolled in an EI program in which each child had an IEP. The children in the EI program had the following conditions or diagnoses: developmental delay (n=13), autism (n=5), autism and developmental delay (n=1) or Down syndrome (n=1). Children attending the inclusive summer preschool program lived in the surrounding underserved, urban neighborhood and were from various ethnic and racial backgrounds. The majority of children were Latino (68%) while others were African American (18%) or White (13%) (Table 1).

### Procedure

A staff occupational therapist (SKI) at the inclusive preschool program (EI and Head Start) was interested in developing and conducting a yoga program for the summer school session at her preschool worksite. Our team of physical and occupational therapists (MON, MB, RII, MFP) collaborated with the site occupational therapist (SKI) to design, implement and evaluate the feasibility of a yoga program at that site. This feasibility study is a secondary analysis of data generated from the preschool yoga program. Permission was granted by the preschool staff and management to allow the team to conduct the yoga program evaluation. IRB approval was obtained from the two universities with whom the project team are affiliated.

Six classroom teachers at the preschool expressed interest in having their students participate in the summer yoga program. They indicated that their students had difficulty transitioning among classroom activities and needed improved focus, attention and motor skills to move through the preschool daily activities in a timely and orderly fashion. The yoga program was designed using sequences of poses to address the teachers' goals and needs for their students [19,20]. Also, the yoga program was designed with three distinct series of poses that were contextualized or embedded in stories about the city and the main landmarks to draw the children's attention and focus to the poses in a fun and enjoyable way and to help them remember the poses as part of the stories [20].

The children would take a journey to each of the three 'stops' (landmark destinations) during their yoga session. To get to each stop, the children had to perform 7-9 poses in a sequence to promote fitness (i.e. strength, balance, agility, and coordination) attention and focus. The yoga facilitators recited a scripted story to cue the children and to engage them in the session. For example, the journey to the zoo included the following poses: Side and Forward Bends, Marching, Warrior II, Walk-Out, Downward Dog, Cow, Lion, Cobra, and Tree.

The yoga program was conducted during the students scheduled playtime in the summer preschool program and was administered over a seven week period with two sessions per week. Pre and post program measures were done in Week 1 and Week 7 and the yoga program was conducted during Weeks 2 through 6 (twice a week for 5 weeks for a total of 10 sessions). There were six groups with 12-14 children per group who each participated in 30 minute yoga sessions twice a week.

The teachers and children were encouraged to attend all sessions. The program did not turn children away. However, children had to attend at least 50% of the sessions to be included in the study. It was expected that this level of program exposure was necessary to promote changes in outcomes [19].

All sessions were facilitated by the preschool site occupational therapist (SKI), physical therapy (PT) and occupational therapy (OT) faculty from partnering universities (MB, RII) and three PT and three OT students. Yoga facilitators were not certified yoga teachers; however they were trained to safely deliver the yoga program and to utilize strategies to engage the pre-schoolers. At least three yoga facilitators were present for every session to ensure the appropriate adult (yoga facilitator): student ratio for the preschool environment. The yoga facilitators worked directly with the pre-schoolers to conduct the yoga sessions.

For each yoga session, children came into the play area with teachers and teacher's assistants, removed their shoes and socks and each child sat on an individual yoga mat. The mats were arranged in a circular fashion with the facilitators sitting on mats with the children or in the middle of the circle. Soft music was played at the beginning (to cue the children and prepare them for the session) and end of the

| Participants              | Full sample (n=71) | Participants in ≥50% of Yoga Sessions (n=39) | Participants in EI and ≥50% of Yoga Sessions (n=13) |
|---------------------------|--------------------|--|---|
| Age (mean, SD)            | 58.15 months (8.0) | 57.15 (8.8)                                  | 54.0 (9.16)   |
| Gender (n, %)             |                    |  |   |
| Male                      | 40 (56.3%)         | 22 (56.4%)                                   | 12 (92.3%)  |
| Female                    | 31 (43.7%)         | 17 (43.6%)                                   | 1 (7.7%)  |
| Preschool category (n, %) |                    |  |   |
| Head Start                | 51 (71.8%)         | 28 (71.8%)                                   | 0   |
| Early Intervention (IEP)  | 20 (28.2%)         | 11 (28.2%)                                   | 13 (100%)   |

Table 1: Descriptive Statistics.

yoga session (to promote relaxation, focus, and organization and to prepare for the transition back to the classroom) [20]. At the end of each session, children donned shoes and socks, lined up and returned to their respective classrooms.

## Measures

The International Classification of Functioning, Disability and Health (ICF Model) provided a framework for the child outcome measures in this feasibility study [21]. Measures were used to examine changes on the personal dimensions of the ICF Model: Body Function and Structure; Activity; and Participation [21].

Five motor tests were used to evaluate changes in gross motor skills before and after the yoga program. One test, the Modified Timed Up and Go (MTUG) documented changes in the ICF Activity Dimension. The MTUG is a quick and practical test to measure functional mobility and it has been validated for children with typical development and those with disabilities [22,23]. For the MTUG, children sat on the floor in a cross leg position and were asked to stand, walk as quickly as possible to a line taped on the floor 3 meters away, turn and then return to the starting position. The timing of this task began when the child initiated standing and stopped when the child was sitting and hands were placed on his/her lap. The therapist provided a demonstration of the activity first and then the child repeated the activity twice after one practice trial. The scores of the two test trials were averaged.

Four single item motor tests were administered to measure changes in ICF Body Function and Structure Dimension. These tests measured motor planning, balance, running speed and agility, and functional strength. Three of the tests were single item motor tasks from the Bruininks Oseretsky Test of Motor Proficiency-2 (BOT-2): 1) Running Speed and Agility Test, 2) Stepping sideways Over a Beam, and 3) Standing on One Leg. Procedures for these three tests were carried out according to the instructions in the BOT-2 manual [24]. The BOT-2 has been validated for children 4 through 21 years and is commonly used by physical and occupational therapists to evaluate motor skills in children [24,25]. The fourth test to measure the ICF Body Function and Structure Dimension was the Sit-to-Stand Test [26]. For this test, children were positioned in sitting on a bench with their hips and knees at 90 degrees. They were asked to move from sitting to standing as many times as they could during a 30 second period. The tester stood to the side of the child to make sure that hip and knee extension was within 15 degrees of full extension for all counted repetitions. The Sit-to-Stand Test is a measure of functional strength and it has good reliability (ICC>0.91) in children with cerebral palsy [26].

The Devereux Early Childhood Assessment Clinical Form (DECA-C) was used to measure changes at the ICF Participation Dimension and to identify changes in contextual (personal) factors [21]. The DECA-C is a standardized test with good psychometric properties used to evaluate positive behaviours and behavioural concerns in children aged 2-5 years [27]. The two total score sections of the DECA-C were used in this study: Protective Factors and Behavioural Control. The Protective Factors section includes three psychosocial subscales (initiative, self-control, and attachment) and the Behavioural Control section includes four psychosocial subscales (attention problems, aggression, emotional control, and withdrawal/depression). High scores on the Protective Factors section reflect positive behavioural change while high scores on the behavioural Control section indicate behavioural concerns [27].

Three of the six preschool classroom teachers completed the DECA-C on their students (n=13) in EI who participated in 50% of the yoga program sessions. The DECA-C was administered to teachers

by interview or self-reports before and after the yoga program. It was anticipated that the DECA-C was an appropriate and responsive measure for children in EI because these children have documented conditions or diagnoses that often include comorbid behavioural concerns. Furthermore, the DECA-C is a useful outcome measure for EI programs to measure children's social and emotional health [27].

The yoga program feasibility was evaluated by observation of sessions (i.e., program process, content and activities), the program implementation process (i.e., sessions completed, child attendance) and anecdotal feedback from teachers and staff.

## Data analysis

Descriptive statistics were generated for all children at baseline (n=71) and for the subset of children (n= 39) who participated in  $\geq$  50% of the yoga sessions. Descriptive statistics also were generated for the subset of children (n=13) who were in EI and who participated in  $\geq$  50% of the yoga sessions. Sample size calculations were not conducted for this feasibility study because the yoga program was implemented as a preschool activity and was open to all students who chose to participate.

The majority of pre and post yoga program data were non-normally distributed, therefore non-parametric statistics were used. Two Friedman's ANOVAs were generated: one to examine statistically significant differences among the five motor outcome measures and one to examine statistically significant differences among the psychosocial outcome measures (DECA-C Protective Factors and Behavioral Control section scores). Wilcoxon signed-rank tests (with Bonferroni corrections) were used to determine significance among multiple pairwise post hoc comparisons. Bonferroni corrections were conducted to adjust the p-value to  $p < 0.01$  for motor outcomes and  $p < 0.025$  for the DECA-C outcomes. Effect sizes (r) were calculated. Data analysis was conducted using IBM SPSS Statistics Version 23 (Armonk, NY).

## Results

A subset of children (n=39, 55%) participated in at least 50% of the yoga sessions and, therefore, were included in the post-program outcome evaluation. The primary reason for children attending less than 50% of the yoga sessions was due to school absence. The average age for this subset of children was 4.76 years (SD: 8.8 months); most were boys (n=22, 56.4%); and the majority were in Head Start (n= 28, 71.8%). Of this subset, all but two children had pre and post measures on all of the gross motor outcomes. One child had missing data on one preprogram measure (Stepping Sideways Over a Beam) and another child had missing data on three post program measures (Sit-to-Stand, MTUG, Stepping Sideways Over a Beam). Also, 13 of the 20 children in EI (65%) participated in  $\geq$ 50% of the yoga sessions and were measured on the Devereux Early Childhood Assessment Clinical Form (DECA-C) before and after the yoga program. This subset of children had an average age of 4.5 years (SD: 9.16 months) and all but one was a boy (n=12, 92.3%). School absence was the primary reason why the other children in EI attending less than 50% of the yoga sessions (Table 1).

The Friedman's ANOVA for the motor measures resulted in a statistically significant difference among the pre and post measures ( $\chi^2(9)=230.71$ ,  $p=0.001$ ). In the follow-up post-hoc analyses, we found significance for two of the five motor test items: Stepping Sideways over a Balance Beam ( $z=-3.34$ ,  $p=0.001$ ) and the Sit-to-Stand Test ( $z=-4.29$ ,  $p=0.001$ ).

Findings on the Friedman's ANOVA for the DECA-C section scores

(Protective Factors and Behavioural Control) indicated that there was a statistically significant difference among pre and post measures ( $\chi^2(3)=15.73, p=0.001$ ). In the follow-up post-hoc analyses, one significant finding was observed for the Behavioural Control section scores ( $z=-2.59, p=0.010$ ). Moderate to large effect sizes were indicated for the significant finding ( $r=0.54-0.72$ ) (Table 2).

Results of the program evaluation suggested that all sessions were conducted as planned with two pre-program measurement sessions in Week 1; twice/week yoga sessions for 5 weeks (10 sessions) (Weeks 2 – 6); and two post-program measurement sessions in Week 7). Findings on supervision and safety were satisfactory. The supervision level met the preschool classroom requirements for the yoga facilitator: student: child ratio (1:4). All facilitators were trained in the program protocol to ensure program fidelity and safety. No injuries were observed or reported.

Overall, the program activities (i.e., session preparation, program sessions with sequences of yoga poses contextualized in stories, session completion with relaxation and breathing exercises) were engaging to the students based on observations of their focus and attention during the sessions. More than half (55%) of the pre-schoolers attended  $\geq 50\%$  of the yoga sessions. Teachers provided informal observations that their students were eager for yoga sessions as evidenced by their interest and their questions about when they could go to yoga again. Also, teachers reported that their students showed improved attention with better transitions among classroom activities.

## Discussion

The purpose of this study was to determine the feasibility and acceptability of a preschool yoga program for children in Head Start or EI. The yoga program was delivered twice a week for 7 weeks in the indoor play area at the preschool. The program goals were identified by the classroom teachers and included increased motor skills, focus and attention to improve classroom transitions throughout the school day.

The program was acceptable to teachers because it was integrated into the regular activity schedule for each classroom and there was no need for any special time accommodations for implementation.

Results indicate that the yoga program was feasible and valued. The children enjoyed the program and improved on coordination and functional strength motor skills. These improvements may be due to the design of the yoga sequences. During yoga sessions the children had to change and hold positions which required transitions from floor to quadruped, to kneeling and standing. These positional changes may have promoted motor planning and coordination. Holding and transitioning through yoga poses may enhance functional strength, especially in the lower extremities which is the motor component measured in the Sit-To-Stand Test. However, three of the motor skills showed only minimal improvement which did not reach significance (Running Speed and Agility; Standing on One Leg, and MTUG). These motor skills may not have been integrated into the yoga sequences at a level to promote change. Although the goals of the program were to increase motor skills and fitness, the sequences of poses may not have been delivered with quick repetition to promote increased muscle power and increased heart rate and exertion for improved running speed and agility. Also, the young children may not have the motor development skills to move through the sequences of poses at higher speeds. Walking activities were not incorporated into the yoga sequences and poses; therefore no significant change was seen in functional mobility as measured by the MTUG. Finally, although Tree Pose was part of the yoga sequence, children may not have had enough exposure to the pose to improve balance and single limb stance. The Tree Pose was difficult for young children so modified Tree Pose may be important as a starting point in future yoga sessions. One way to increase exposure to Tree Pose is to modify the pose and/or add a sequence of poses in which children visit a 'tropical animal habitat' and have the opportunity for multiple attempts to use Tree Pose with different animal poses such as the flamingo, stork and crane.

The outcomes for the subset of children (n=13) who were measured

| Outcomes   | Pre-Intervention Mean, SD (CI <sub>95</sub> ) | Post-Intervention Mean, SD (CI <sub>95</sub> ) | Mean Difference (Post-Pre) | Pre-Intervention Mdn (IQR) | Post-Intervention Mdn (IQR) | Effect Size (r) | Statistic (z)     | Significance Level  |
|--|---|--|----------------------------|----------------------------|-----------------------------|-----------------|-------------------|---------------------|
| <b>Gross Motor Outcomes</b>                        |   |  |                            |                            |                             |                 |                   |                     |
| Modified TUG* (seconds) n=38                       | 9.52, 2.86 (8.61-10.43)                       | 9.03, 2.60 (8.20-9.86)                         | - 0.49                     | 8.50 (7.66 – 10.13)        | 8.54 (7.11 – 9.88)          | 0.30            | z = -1.864        | p = 0.062           |
| Running Speed and Agility (seconds) n=39           | 14.61, 6.14 (12.68-16.54)                     | 14.46, 6.21 (12.51-16.41)                      | - 0.12                     | 12.20 (11.10 – 15.50)      | 13.10 (10.90 -14.60)        | 0.10            | z = -0.604        | p = 0.564           |
| Stepping Sideways Over a Beam (# repetitions) n=38 | 19.00, 7.55 (17.78-21.40)                     | 21.61, 7.91 (19.10-24.12)                      | 2.24                       | 20.00 (12.25 – 25.25)      | 24.00 (17.75-27.25)         | <b>0.54</b>     | <b>z = -3.341</b> | <b>p = 0.001</b>    |
| Single Limb Stance (seconds) n=39 (pre and post)   | 2.68, 1.08 (2.340– 3.03)                      | 2.84, 1.57 (2.34- 3.34)                        | 0.16                       | 3.00 (2.00 – 3.00)         | 3.00 (2.00 -3.00)           | 0.01            | z = - 0.060       | p = 0.952           |
| Sit-to-Stand (# repetitions) n=38                  | 16.66, 6.59 (14.52– 18.66)                    | 21.11, 7.56 (18.71-23.51)                      | 4.02                       | 16.00 (10.00 – 21.00)      | 20.50 (16.00- 25.25)        | <b>0.70</b>     | <b>z = - 4.29</b> | <b>p &lt; 0.001</b> |
| <b>DECA-C Outcomes</b>                             |   |  |                            |                            |                             |                 |                   |                     |
| DECA-C** Protective Factors n=13                   | 27.23, 8.10 (22.83-31.63)                     | 33.54, 9.72 (31.24-35.84)                      | 6.31                       | 28.00 (28.00 – 28.50)      | 29.00 (28.00-34.50)         | 0.43            | z = -1.54         | p = 0.123           |
| DECA-C Behavioral Control n=13                     |   | 42.92, 10.91 (40.49-45.35)                     | 7.07                       | 36.00 (28.50 – 39.00)      | 42.00 (34.00-48.00)         | <b>0.72</b>     | <b>z= -2.59</b>   | <b>p = 0.01</b>     |

\* TUG – Timed Up and Go \*\*DECA-C - Devereux Early Childhood Assessment – Clinical Form

Table 2: Child Outcomes.



on the DECA-C were unexpected. Scores on the Total Protective Factors section increased but did not reach significance while the scores on the Total Behavioural Control section increased to a significant level. These findings suggest that for Protective Factors there were trends for improvement on the subscales: initiative, self-control and attachment. Across these subscales, the children may have improved on child initiative (ability to use independent thought and action to meet needs) and self-control (ability to experience a range of feelings and express them appropriately) because the yoga program was structured to provide children with a supportive, adapted environment including direction and some choice in the poses and stories used in the sessions [27]. It is unlikely that the yoga program addressed attachment (relationships between a child and significant others) because the program did not have an interactive component among children or families; however teachers did participate as able [27].

There was a significant negative finding on scores for the DECA-C Behavioural Control section. The scores for this section increased indicating that children had higher levels (i.e., decreased behaviour control) on the Behavioural Control subscales: attention problems (ability to focus on a task and ignore distractions), aggression (hostile or destructive behaviours), emotional control (difficulty in adjusting from negative to positive expressions), and withdrawal/depression (behaviours related to social and emotional withdrawal) [27]. We hoped that the yoga program would help improve attention. Given the design and implementation of the yoga program it may be that we did not focus enough on attention during the sessions to promote improvement. Other possible explanations for the increase in negative behaviour indicators may be that the children have difficulty adjusting to the introduction of new routines and experiences. Furthermore, the children with developmental and learning challenges receiving EI may require additional processing time and activity frequency to internalize and engage in behavioural repertoires within new activity routines. Additionally, the preschool is located in an underserved, urban neighbourhood which can be a stressful environment for children and may contribute to the children's motor and behavioural challenges [6,7,28]. Considering these potential challenges and stressors, a yoga program at higher frequency and duration with specific content to address social-emotional, behavioural and self-regulation concerns may be needed to promote positive outcomes.

Evidence indicates that improvement in well-being and self-regulation has been found in elementary and high school students who were exposed to yoga programs at higher intensity and duration (sessions up to 5 times per week for 3-4 months) than what was delivered in our program [7,10]. It may be necessary to increase buy-in from all preschool staff (teachers, staff, physical and occupational therapists) for sustainability and to deliver the yoga program at a higher intensity and duration to promote changes in motor and behavioural outcomes. Additionally, the yoga program may be more impactful and have more carryover and sustainability if it is incorporated into the classroom environment and routines rather than being a program that is part of the school day (i.e., a 'recess' activity in the play area).

It was anticipated that attendance in at least 50% of the sessions was important to promote change on motor outcomes [19]. However, although this summer yoga program had fair to good frequency (twice/week) it had a short duration (7 weeks) and only 55% of the participants attended at least 50% of the sessions. Therefore, it may be important to increase the required attendance level in addition to increasing program frequency and duration for sufficient dosage to promote change in motor, social, behavioural and self-regulatory skills. Evidence from a

preschool yoga program that did find improvement on self-regulation and executive function and control indicated that the program was conducted daily as part of the classroom curriculum for 25 weeks [29]. These findings suggest that our preschool yoga program for children at risk or with developmental delay may need to be strengthened and revised to improve outcomes.

## Limitations

Limitations to this study include a one group pre-test post-test design (no control group) and a program that was short duration (7 week program with 5 weeks of yoga sessions) and limited intensity (twice/week at 30 minutes/session). Also, we had a small sample size of pre-schoolers in EI (n=13) for the behavioural and psychosocial measures. Furthermore, although the yoga program was integrated into the children's school day, it was not integrated into the classroom environment and routines which may have limited carryover and overall sustainability. Also, the overall yoga program attendance was less than expected but this was primarily due to school absence. Low school attendance may be a factor associated with the inner-city location of the preschool and the stressors and challenges families may face in getting their children to school [6,7,28,29]. We anticipate that because the yoga program was feasible, acceptable and enjoyable that perhaps the program may help promote school attendance, especially if families are included in the yoga sessions in the future.

This yoga program was feasible and valued and provides preliminary support for a preschool integrated yoga program for improving motor skills. In future investigations, a more stringent study using a control group or cross-over design should be utilized and the program should be revised for increased frequency and duration. Additionally, integration of the yoga program into the classroom curriculum should be considered to support carryover and sustainability.

## Conclusions

A yoga program is feasible in an integrated preschool and can be successfully implemented by occupational and physical therapy staff and students and it may be effective to foster motor skill development in preschool aged children. Further research is needed to examine the impact of the yoga program on behavioural, social-emotional, and self-regulation for pre-schoolers. Inclusion of teacher and classroom staff training to increase frequency and duration of yoga programs may be necessary to demonstrate improvements in all teacher goals (behaviour, motor and attention skills). In addition to a structured yoga program, physical and occupational therapists may serve as consultants to teachers and staff for translation of yoga poses into classroom activities and routines.

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**Citation:** O'Neil ME, Ideishi RI, Benedetto M, Ideishi SK, Fragala-Pinkham M (2016) A Yoga Program for Preschool Children in Head Start and Early Intervention: A Feasibility Study. *J Yoga Phys Ther* 6: 238. doi:[10.4172/2157-7595.1000238](https://doi.org/10.4172/2157-7595.1000238)

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