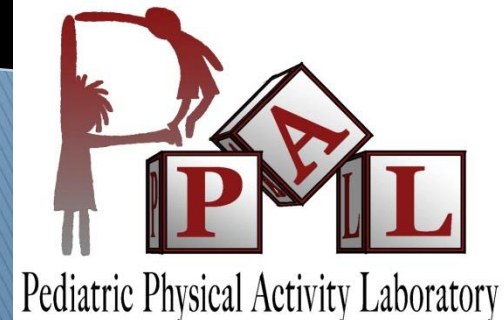


TEACHER-LED PRESCHOOL PHYSICAL ACTIVITY INTERVENTIONS

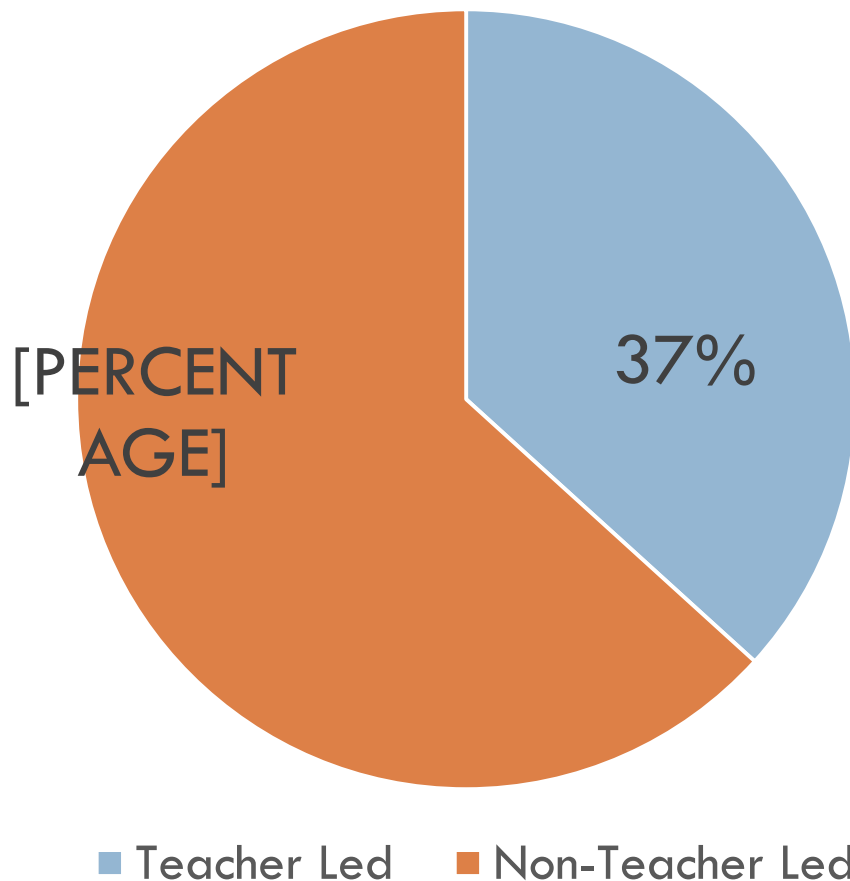
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October 17, 2016



Background

- Physical activity (PA) recommendation
 - ▣ 60 minutes/day (Tremblay et al., 2012)
- Most preschoolers do not meet the current PA recommendation (Pate et al., 2015)
- Different types of PA studies have been conducted to improve the PA level of preschoolers
 - ▣ Mixed results
 - ▣ Types of studies

Published preschool PA intervention outcome 2000 – 2016



Total = 49
outcome articles

- Sustainability of researcher-led interventions
 - ▣ Changes not sustainable once researchers leave
 - Ward et al., 2009
 - Summerbell et al., 2012
- Ways to increase sustainability
 - ▣ Teacher or staff led interventions

Preschoolers skill-based Activity study (Project PLAY)

Alhassan et al., *Pediatric Exercise Science*, 2012;24:435-449

Fundamental movement skills (FMS)

- Locomotor skills (LMS)
 - ▣ Running, hopping, skipping, leaping, sliding, galloping
 - ▣ Associated with PA in older children
- Object control
 - ▣ Throwing, catching, kicking, striking, batting
- LMS proficiency tracks into adolescence
- FMS delayed in children of color



- FMS instructions
 - ▣ Elementary school
 - PE teachers
 - ▣ Preschool
 - Classroom teacher
 - Not adequately trained



Purpose

- To examine the efficacy of a classroom teacher-taught, FMS-based PA program on locomotor skills and PA levels of minority preschoolers

Study overview

2 CC randomized

- 1 LMS-PA
- 1 UF-PA (control)

Teacher training

- LMS-PA 8 hrs
- UF-PA 2 hr

Participant recruitment for assessment

6 month intervention

- 30 min/day
- 5 days/wk

LMS-PA intervention

- ❑ Specific instructions and activities were designed to teach LMS
- ❑ Curriculum consisted of 30 individual lesson plans
- ❑ The number of days needed to instruct each lesson plan ranged from 2 to 5 days



UF-PA intervention

- Supervised free time for the preschoolers to play on their own or with other children
- Outdoor playtime activities were not altered and instructions were not provided

Assessments

- 3 time-points
 - ▣ Baseline, 3-months, 6-months
- Physical activity
 - ▣ ActiGraph Accelerometers
- Locomotor skills
 - ▣ Test of Gross Movement Development, 2nd edition
 - Running, galloping, hopping, leaping, horizontal jumping, & sliding



Changes in locomotor skills

Variable	LMS-PA (n = 43)		UF-PA (n = 28)		Adjusted mean difference (95% CI)	P value	Cohen's <i>d</i>
	Baseline	Post	Baseline	Post			
Running	6.5±1.4	7.5±0.8	6.0±1.3	7.1±1.0	-0.06 (-0.81 to 0.68)	0.86	0.05
Gallop	4.4±1.9	6.3±1.6	3.7±2.2	5.0±1.8	0.25 (-1.13 to 1.63)	0.57	0.10
Hopping	3.7±2.5	6.2±2.6	2.6±2.4	5.9±2.3	-0.90 (-2.05 to 0.25)	0.17	0.41
Leaping	1.7±1.9	3.7±2.0	1.0±1.3	1.7±2.0	1.50 (0.41 to 2.58)	0.009 *	0.80
Jumping	3.6±1.6	5.4±2.0	2.8±2.0	4.4±2.4	0.59 (-0.57 to 1.74)	0.32	0.29
Sliding	2.6±2.2	6.4±2.2	1.6±2.1	4.8±2.4	0.371 (-1.36 to 2.10)	0.54	0.12
Percentile	29.7±20.6	52.5±17.9	28.1±20.0	41.7±22.1	8.70 (-4.66 to 22.07)	0.19	0.38

* Significant with Bonferroni adjustment ($p = 0.01$)

Change in physical activity

Variable	LMS-PA (n = 43)		UF-PA (n = 28)		Adjusted mean difference (95% CI)	P value	Cohen's d
	Baseline	Post	Baseline	Post			
During Preschool PA (% Time)							
Sedentary PA	78.3±4.5	74.6±8.4	74.2±7.1	77.9±4.2	-9.6 (-17.5 to -1.8)	0.02 *	0.02
Light PA	16.0±2.5	16.3±3.0	17.0±3.7	14.9±3.1	2.9 (-1.3 to 7.2)	0.19	0.67
MVPA	5.7±2.6	6.5±4.3	8.7±4.4	7.2±1.9	3.4 (-0.7 to 7.6)	0.13	0.15
Total Daily PA (% Time)							
Sedentary PA	76.2±5.5	73.7±8.0	70.6±7.0	74.7±6.0	-9.3 (-15.1 to -3.6)	0.01 *	0.30
Light PA	16.7±2.5	17.1±3.1	17.5±3.0	17.2±3.3	1.4 (-1.7 to 4.4)	0.45	0.80
MVPA	7.1±3.9	7.9±3.9	10.7±4.8	8.9±3.0	2.9 (-1.1 to 7.0)	0.23	0.50

?

* Significant with Bonferroni adjustment ($p = 0.02$)

Take home message

- Teachers can be adequately trained to teach preschoolers LMS
- Intervention led to significant improvements in
 - ▣ Locomotor skills – Leaping
 - ▣ Decrease in sedentary time
- Process evaluation
 - ▣ Intervention lesson plans -- too long



Short bouTs of Exercise for Preschoolers (STEP study)

Alhassan et al., *BMC Public Health*, 2012;12:582-591

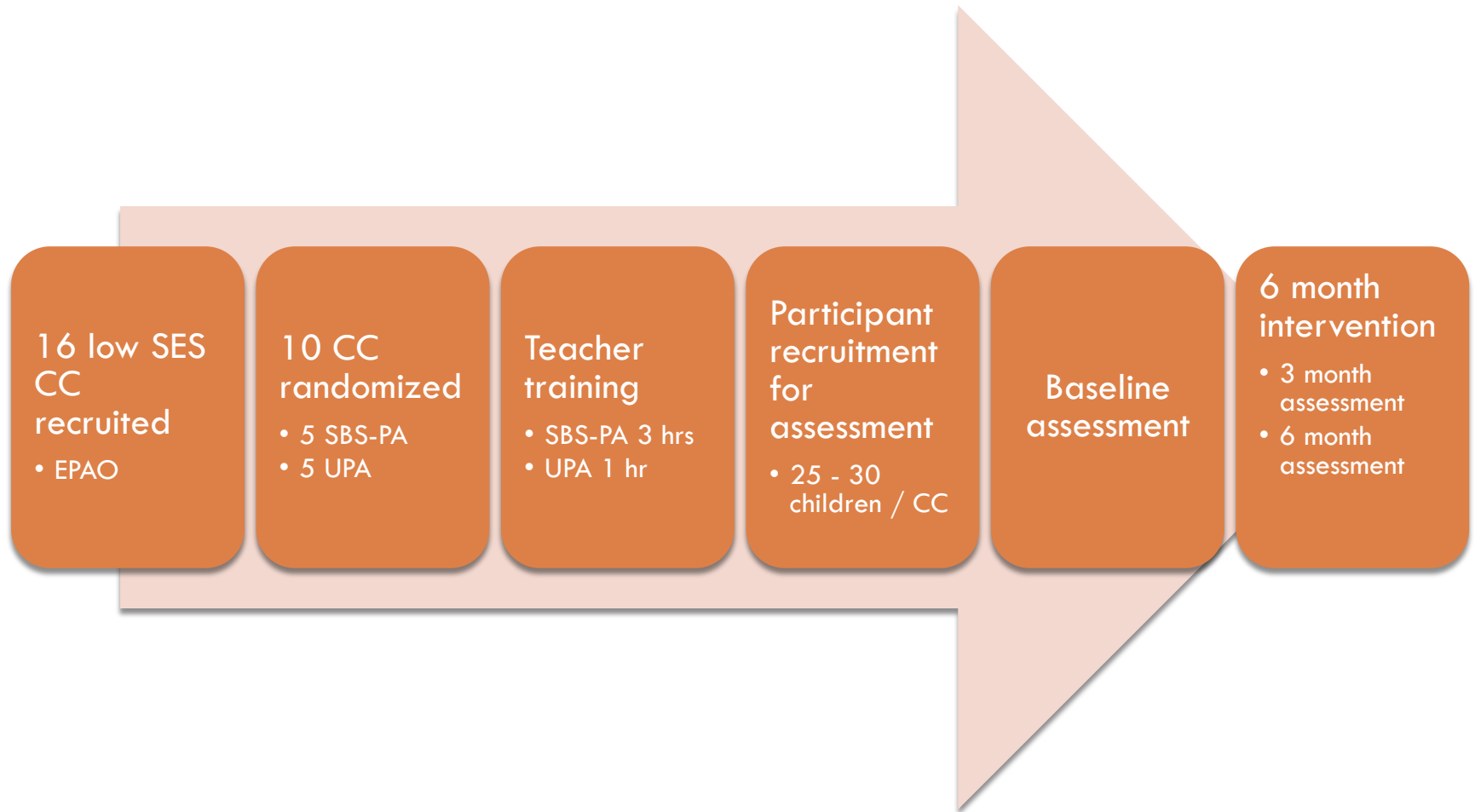
Alhassan et al. *J School Health*, 2016;86:526-

- 8-12 minutes of MVPA during a typical 30-minute gross-motor playtime
 - ▣ Accumulation of MVPA during the 1st 10 minutes
- Longer activity period \neq more activity
- Shorter bouts of PA (≤ 10 minutes per session)
 - ▣ Successful strategy for improving children's PA, body weight, and academic performance in elementary school age children

Purpose

- To examine the feasibility and effect of short bouts of structured PA (SBS-PA) implemented in the classroom for the first part of designated gross motor playtime on preschoolers PA level

Study overview



Intervention

- Interventions designed to be
 - ▣ In line with the state mandate
 - MA Department of Early Education and Care policy number 606 CMR 7.04(7)(a)8
 - ▣ Provided an opportunity for 60 minutes of daily PA
 - Morning and afternoon gross motor playtime
 - 30 minutes each time
 - 5 days/week for 6 months

SBS-PA Intervention

- Adapted from Instant Recess[®] program
- Short structured bouts of PA (DVD)
 - ▣ 16 DVD created for intervention
 - ▣ DVD designed to be watched by teacher
 - ▣ During 1st 10 min of gross motor playtime (classroom)
- Remaining 20 minutes
 - ▣ Supervised free playtime for the preschoolers to play on their own or with other children

UPA (control intervention)

- Supervised free time for preschoolers to play on their own or with other children
- Gross motor playtime activities were not altered and instructions were not provided

Study process evaluation

- Study process evaluation --- at least twice per week per center
- Research staff used a standardized semi-structured questionnaire to assess
 - ▣ If intervention was implemented as designed
 - ▣ Duration of the gross-motor playtime
 - ▣ Location of gross-motor playtime
 - ▣ Percentage of children in the classroom participating in intervention
 - ▣ Perceived children enjoyment level
 - ▣ Time allowed for structured and unstructured free playtime
 - ▣ Transition time
- Teachers' perceptions of the intervention were assessed at the completion of the study using an open-ended questionnaire

PA Assessments

- Time points
 - ▣ Baseline
 - ▣ Mid-point (3-months)
 - ▣ Post (6-months)
- PA assessments
 - ▣ ActiGraph accelerometers
 - Preschool-day (7:30 am – 4:30 pm)
 - ▣ Direct observation (OSRAC-P)
 - 30 minute intervention

Results: Direct Observation of PA during 30 min session

	Baseline	3 month	6 month
% Interval spent at Sedentary			
SBS-PA	27.5 ± 27.4	18.3 ± 29.0	22.6 ± 35.3
UPA	22.2 ± 25.7	18.3 ± 18.3	23.2 ± 28.0
% Interval spent at Light PA			
SBS-PA	32.1 ± 21.3	34.3 ± 24.7	44.3 ± 29.8
UPA	49.6 ± 23.7	54.0 ± 23.0	47.6 ± 28.3
% Interval spent at MVPA			
SBS-PA	38.6 ± 30.6	43.8 ± 33.3	33.0 ± 28.2
UPA	27.9 ± 27.6	25.4 ± 23.1	27.7 ± 27.2

- No group by visit interaction
- Group main effect
 - Light ($p < 0.0001$)
 - MVPA ($p = 0.0009$)

Results Accelerometer: Change in Sedentary percent time

	During Preschool-day PA			Within group change (p-value)		
	Baseline	3 month	6 month	BL-3mo	3mo-6mo	BL-6mo
SBS-PA	73.2 ± 6.9	75.2 ± 7.3	76.4 ± 7.2	0.13	0.62	0.05
UPA	76.0 ± 5.9	76.4 ± 5.9	77.2 ± 6.1	0.96	0.30	0.27
p-value	0.23	0.93	0.17			

Change in MVPA percent of time

	During Preschool-day PA			Within group change (p-value)		
	Baseline	3 month	6 month	BL-3mo	3mo-6mo	BL-6mo
SBS-PA	6.9 ± 3.3	5.5 ± 3.2	5.2 ± 3.3	0.008	0.37	0.11
UPA	6.3 ± 3.5	5.8 ± 3.1	5.7 ± 3.1	0.76	0.21	0.11
p-value	0.39	0.13	0.08			

Study fidelity results

Fidelity Question (% responding “yes” for each question)	SBS-PA	UPA
Did intervention last for at least 30 minutes	56.6%	75.2%
Was SBS-PA DVD implemented during the 1st 10 minutes of intervention?	86.5%	n/a
Was the SBS-PA DVD implemented in the expected 10-minute duration?	89.3%	n/a
Did at least 50% of classroom children participate during the SBS-PA DVD?	75.3%	n/a
Did classroom teacher implement the SBS-PA DVD as intended (i.e., teacher leading the DVD and students following teacher)?	67.2%	n/a
Did 20 minutes of gross motor time follow the SBS-PA?	68.5%	n/a
Did gross motor time last for at least 20 minutes?	52.0%	n/a

Conclusion

- SBS-PA intervention led to significant improvements in directly observed light PA and MVPA during intervention time
 - ▣ But not in total preschool-day activity
- Significant differences in the delivery of the two intervention components
 - ▣ SBS-PA teachers were more likely to implement the DVD compared to the 20-minute gross motor free playtime

- SBS-PA teachers cited time as the main barrier for implementing classroom portion of intervention
- One teacher stated...
 - ▣ *“In order to do the DVD I have to rearrange my classroom, which takes time and then after the DVD; I have to get the children into circle time before they can get dressed to go outside. So although the program is only 30 minutes, it actually took me anywhere from 45 to 60 minutes.”*

- SBS-PA teachers indicated that they used the DVD at other times of the day
- Teacher stated...
 - ▣ *“The DVD was really useful when they were acting out, and I need them to settle down. I noticed that they were a bit calmer when they did the DVD or right when we came back from outside.”*
- Future directions
 - ▣ Use as additional tool
 - ▣ Integrated into lesson plans



Physical activity, diet, and sleep (PADS)

Purpose

- Examine the impact of incorporating PA into MA learning standards on preschooler's PA level

Study overview

5 CC recruited

- PA environmental audit

3 CC randomized

- 1 PADS
- 1 CON

Teacher training

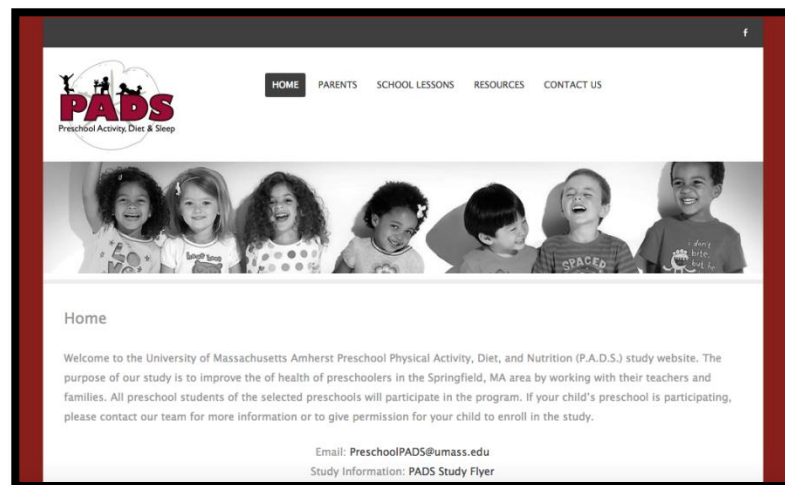
- PADS 2 hrs
- CON 1 hr

Baseline assessment

- 12 week intervention
- 4 day/wk

Intervention components

- **Preschool**
 - ▣ **Integrated MA Early Learning Standards**
 - **PA, sleep, & nutrition**
 - Morning
 - Short bout PA
 - After nap
- **Parent component**



MA learning standards

- MA Curriculum Framework – Comprehensive Health
- MA Curriculum Framework – Math
- MA Guidelines for preschool learning standards
- MA learning standards – Science
- MA learning standards – Social and emotional learning

Example lesson plan

Physical Activity Lesson 2: “Animal Anatomy”

MA Curriculum Framework Links: Mathematics - Measurement and Data

- MA.1. Recognize the attributes of length, area, weight, and capacity of everyday objects using appropriate vocabulary (e.g., long, short, tall, heavy, light, big, small, wide, narrow).

Duration: 5 - 10 minutes

Materials

- Music
- Animal flashcards

DAY 2 - Animal Opposites

Directions: The teacher will describe an animal with descriptive words and ask the students to move around like that animal. While the students are moving, the teacher will ask the students to move around like the opposite animal, (e.g. If students were moving like a small animal with short legs – a mouse – they can then move like a big animal with tall legs – a bear).

- Mouse crawl (short/small) & Bear crawl (tall/big)
- Gorilla (wide) & fish (narrow)
- Bumblebee (short wings) & Eagle (long wings)
- Turtle (slow) & Cheetah (fast)
- Elephant (heavy) & Rabbit (light)
- Snake (low) & Giraffe (high)

Physical Activity Lesson 3: “Counting Pirates”

MA Curriculum Framework Links: Mathematics - Counting and Cardinality

- MA.1. Listen to and say the names of numbers in meaningful contexts.
- MA.2. Recognize and name written numerals 0–10.

Duration: 5 – 10 minutes

Materials

- Number flash cards (1 through 10)
- Deck of handmade cards (4 suits, Numbers 1-10 only)

DAY 1 - Treasure Hunt

Directions: The students will line up behind the teacher and follow directions as they are lead through a “treasure hunt”. The teacher may hold up number cards as they start each action.

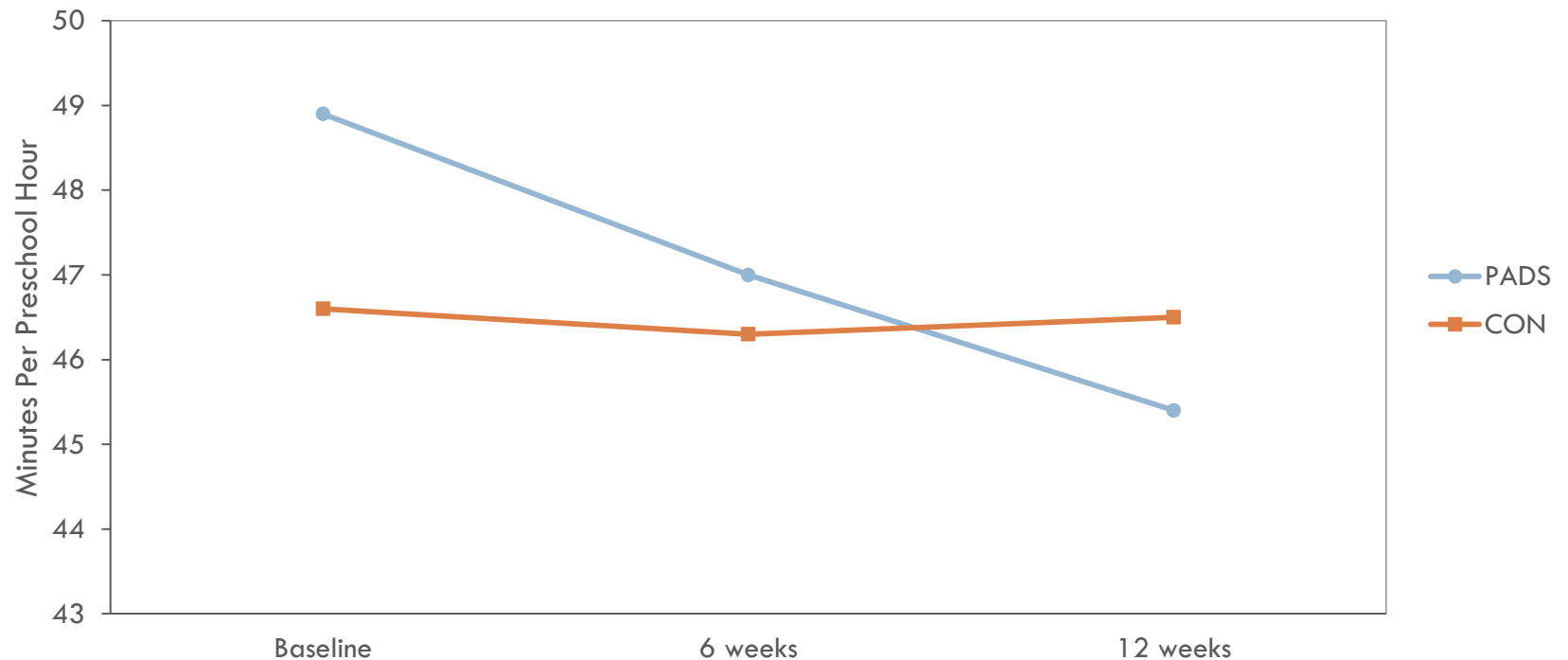
1. Off the ship (1 broad jump)
2. Log roll under the fort wall (2 rolls)
3. Belly crawl under the fishing nets (3 low crawls)
4. Hop across the hot sand (4 hops)
5. Jump high to grab a coconut (5 jumps)
6. Swim across the stream (6 swim strokes on belly)
7. Duck under the jungle branches (7 squatting walks)
8. March with high knees through the mud (8 marches)
9. Run 9 paces around the quicksand (jog in place 9x)
10. Jump for joy - found the treasure (10 jumps)

Assessments

- 3 time points
 - ▣ Baseline
 - ▣ 6 weeks
 - ▣ 12 Weeks
- Variables
 - ▣ PA – ActiGraph
 - 7 days/week
 - ▣ EPAO

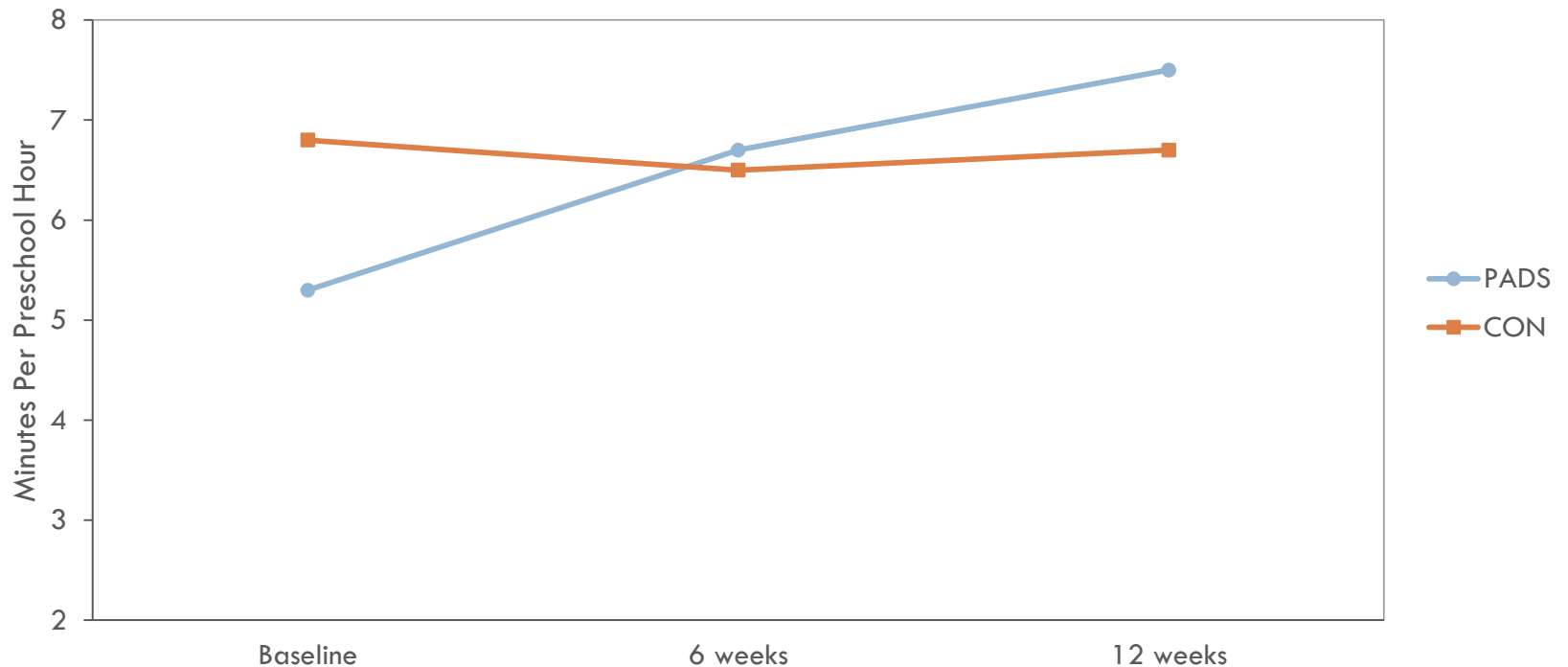


Sedentary time (min/ hour of preschool day)



PADS	48.9 ± 0.8	47.0 ± 0.8	45.4 ± 0.7
CON	46.6 ± 0.7	46.3 ± 0.8	46.5 ± 0.7
Baseline to 12 Weeks – MD = -3.5 ± 0.9; p < 0.001			

MVPA time (min/ hour of preschool day)



PADS	5.3 ± 0.05	6.7 ± 0.5	7.5 ± 0.5
CON	6.8 ± 0.5	6.5 ± 0.5	6.7 ± 0.5
Baseline to 12 Weeks – MD = 2.3± 0.6; p < 0.001			

Conclusion

- PA integrated into learning standards
 - ▣ Effective in increasing % time spent in MVPA
 - Preschool-day
 - Total day
- Less demand placed on teachers' time
- Limited impact on preschool environment

Take home message on teacher-led PA interventions

- Teacher-led PA valuable mean of altering PA
- Potentially more sustainable
 - ▣ Less competition for teacher limited time
- Future goals
 - ▣ Assess the sustainability of interventions on
 - PA levels overtime
 - EEC relicensing and accreditation

Acknowledgement

- Funding source
 - ▣ RWJF – ALR 65628
 - ▣ RWJF – ALR 68509
- Childcare centers
- Graduates students
- Undergraduate students