The Effect of Parental Involvement on Children's Physical Activity

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Objectives To assess the amount, intensity, enjoyment, and preference of children's physical activity in a controlled gymnasium setting under 3 experimental, social conditions: alone, with a parent watching, and with a parent participating.

Study design Children (n = 10 girls, 10 boys), 3-6 years old, along with 1 parent (n = 17 mothers, 3 fathers) per child participated in each social condition on separate days for 30 minutes in which they could choose from a variety of physical and/or sedentary activities.

Results A greater number of accelerometer counts ($P \leq .02$) were accumulated during the parent participating (109 523 ± 32 155 counts) condition than the alone (67 938 ± 37 857 counts) and parent watching (85 624 ± 44 985 counts) conditions. Counts during parent watching were also greater ($P = .01$) than alone. More time ($P \leq .008$) was allocated to sedentary activities during the alone (16.2 ± 9.6 minutes) condition than parent watching (9.6 ± 9.3 minutes) and parent participating (3.8 ± 5.1 minutes). Children liked ($P \leq .02$) the parent participating (9.9 ± 0.45 cm) condition more than alone (8.0 ± 2.72 cm) and parent watching (8.7 ± 1.52 cm). A greater ($P < .001$) proportion of children identified the parent participating (80%) as their preferred condition over either the parent watching (10%) or alone (10%) conditions.

Conclusions Parental participation during physical activity (or at minimum direct supervision) may be an important component in the development of physical activity environments intended to maximize physical activity behavior in children. *(J Pediatr 2016;170:206-10)*.

Children in modern, developed and some developing nations are not participating in adequate amounts or intensities of physical activity.[1,2] This inadequate physical activity participation, along with poor dietary habits, results in the development of childhood obesity and the risks of obesity-related disorders, which have become major public health concerns.[1,2] As such, numerous studies have examined methods to promote greater physical activity participation in children. One factor, parental influence, has been cited as an important predictor of physical activity behavior in children by several nonexperimental studies.[3-5] Parents are believed to play an important role in shaping children's physical activity participation through support and behavioral modeling.[3,6] Factors such as parents purchasing equipment, paying participation fees, providing transportation, co-participation, offering encouragement, and discussing the benefits of physical activity have all been found to be positively associated with children's physical activity behavior.[3] Physically active parents are more likely to have physically active children.[5,7-9]

Although evidence from the extant nonexperimental studies provides evidence in support of the notion that parental activity behavior and their support for their children's participation in physical activity are positively associated with their children's physical activity, it is unknown what the causal impact of parental presence and active involvement in play may be on the amount and intensity of their child's physical activity. The purpose of this study was to assess the amount, intensity, enjoyment (ie, liking), and preference of children's physical activity in a controlled setting under 3 experimental, social conditions: alone, with a parent watching, and with a parent participating in the activity with their child. It was hypothesized that the parent participating condition would increase children's physical activity behavior relative to the alone condition. We also hypothesized that the parent watching condition would not increase children's physical activity relative to the alone condition as parents would not be modeling or encouraging physical activity behavior during the watching condition.

Methods

Children (n = 10 girls, 10 boys) between the ages of 3-6 years old (mean age = 4.05 ± 0.94 years; Table I), along with 1 parent (n = 17 mothers, 3 fathers) per child were recruited from the local community through flyers and from a database of families who previously contacted the laboratory for separate, unrelated studies. Children, along with 1 parent per child

MET	Metabolic equivalent
VO_2 mL·kg^{-1}·min^{-1}	Relative volume of oxygen consumed

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The authors declare no conflicts of interest.

0022-3476/$ - see front matter.
http://dx.doi.org/10.1016/j.jpeds.2015.11.072

Table I. Children's and parent's physical characteristics (data are means ± SD)

	Boys (n = 10)	Girls (n = 10)	Fathers (n = 3)	Mothers (n = 17)
Age (y)	4.30 ± 0.95	3.80 ± 0.92	36.67 ± 0.58	32.29 ± 5.43
Height (cm)	110.08 ± 9.81	100.27 ± 12.49	181.25 ± 8.12	164.11 ± 5.78
Weight (kg)	18.77 ± 2.85	17.03 ± 3.96	105.75 ± 28.69	73.62 ± 22.97

participated in 3 social conditions (playing alone, with their parent watching, and with their parent participating) on separate days in a 4360 square foot gymnasium. Children and parents were excluded from the study if they had any contraindications to exercise (ie, orthopedic injury, cardiovascular disorder, etc.). This study was a within-subjects design with all children being exposed to the 3 social conditions in a randomized order. The same parent participated in both the parent watching and the parent participating conditions with their child. This study was approved by the University Institutional Review Board.

Upon arrival for the first visit, parental consent and child assent were obtained. The parent and child then underwent anthropometric assessments (Table I). Parents and children were measured for height via a stadiometer and weight by using a balance beam scale (Health O Meter, Chicago, Illinois). In addition to height and weight, sex and age were recorded. During each of the 3 separate social condition laboratory visits, participants were taken to a 4360 square foot gymnasium where there was a variety of age-appropriate physical activity options and sedentary alternatives. The set-up of the gymnasium was similar to what was used in previous studies conducted by Sanders et al[10] and Barkley et al.[11] Physical activity equipment consisted of jump ropes, basketballs and hoops, hurdles, footballs, soccer balls, and multiple obstacle courses made up of gymnastic/soft-play equipment.[10,11] The sedentary activity area was equipped with 2 tables and 2 chairs to accommodate both the child and parent. Children and parents had to sit if they were playing with the sedentary alternatives. The age-appropriate sedentary alternatives included action figures, toy dolls, board games, reading books, crayons, markers, colored pencils, blank paper for drawing, and coloring sheets.[10,11] After being shown the physical activity options and sedentary alternatives the child was fitted with an accelerometer (Actigraph GT1M, Pensacola, Florida) that was wrapped around their waist and recorded the number of physical activity counts per session for each child.[12] After being fitted with the accelerometer, the child was given permission to participate in any of the sedentary and/or physical activities they wished, in any pattern for 30-minutes. Metabolic equivalents (METs) were calculated from accelerometer counts by using a method previously employed by Freedson et al.[13] METs were then converted to estimated relative volume of oxygen consumed (VO_2 $mL \cdot kg^{-1} \cdot min^{-1}$) by using the following conversion: 1 MET = 3.5 $mL \cdot kg^{-1} \cdot min^{-1}$ VO_2. Once estimated relative VO_2 ($mL \cdot kg^{-1} \cdot min^{-1}$) was calculated, it was converted to absolute VO_2 ($L \cdot min^{-1}$) and then the following equation was used to calculate kilocalories expended: $kilocalories \cdot minute^{-1} = VO_2\ (L \cdot min^{-1}) * 5$.[13,14]

The alone social condition consisted of the child participating in the sedentary and/or physical activities with their parent not being present in the gymnasium. The parent watching social condition was the same as the alone condition except the parent was seated in a chair in the gymnasium watching their child participate in the activities. During this condition, the parent was allowed to speak with their child, however, they were instructed not to instruct the child about which activities they should or should not use. Parents were also not allowed to leave their chair, and while seated in the chair the parent was not allowed to read or be on their electronic devices. Finally, the parent participating social condition consisted of having the parent actively participating with their child in the sedentary and/or physical activities that the child chose to participate in. Parents were instructed to follow their child and play with the activities their child chose. The parent was not to select the activities nor instruct their child what activities to use. Instead, the parent was to let the child dictate the activities they wished to participate in. Apart from the participant child, research personnel and the parent during the parent watching and parent participating conditions, there were no other individuals present in the gymnasium during each session.

In addition to accelerometry data, the time children allocated to sedentary and physical activities during each 30-minute activity session was recorded by direct observation of research personnel using a stopwatch. At the end of each 30-minute session, each child was asked to indicate their liking of the activity using a validated visual analog scale by marking on a 10-cm line anchored by "like it very much" on the left and "do not like it at all" on the right.[15] Children were then asked if they would like to play for an additional 10 minutes or if they wished to be finished for the session. If a child elected to participate in an additional 10 minutes of activity they followed identical procedures to their initial 30 minutes for that day. After all 3 conditions were completed, each child was asked to indicate which condition (alone, with a parent watching, or with a parent participating) was their favorite.

Statistical Analyses

Independent samples *t* tests were used to examine any sex differences (boys, girls) in physical characteristics (ie, age,