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An Exploratory Study of Infant Physical Activity in Relation to Obesity

Danae M. Dinkel

University of Nebraska at Omaha, dmdinkel@unomaha.edu

Jung-Min Lee

University of Nebraska at Omaha, jungminlee@unomaha.edu

Kailey Snyder

University of Nebraska at Omaha, kesnyder@unomaha.edu

Anastasia Kyvelidou

University of Nebraska at Omaha, akyvelidou@unomaha.edu

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ABSTRACT

Historically, society has thought that infants (0 to 1 year of age) are “active enough” and not in need of efforts to promote physical activity (PA). However, approximately 10% of infants in the U.S. are obese and research has shown low PA is one of the risk factors for obesity in toddlers. Little research has been done to systematically compare PA levels between normal weight infants and obese/overweight infants in the first year of life. **PURPOSE:** The purpose of this study was to determine the level of PA in normal weight and overweight infants. **METHODS:** Twenty-one normal weight infants (age = 3.0 ± 0.4 month, weight-for-length z-score 50.6 ± 25.0) and nine overweight infants (age = 3.0 ± 0.4 month, weight-for-length z-score 97.4 ± 2.1) were recruited to participate in the study. Anthropometric measurements (e.g., height, weight) were taken at three different time points to determine infant size: 3-months of age, the onset of sitting, and one month post onset of sitting. Additionally, infant PA was assessed using Actigraph GT9X Link accelerometers at each time point. Infants wore two accelerometers on the left wrist and ankle for 4 consecutive days (2 weekdays, 2 weekend days). Caregivers were asked to complete a time activity diary every day the accelerometer was worn to document infant activity (e.g., sleeping, eating, quiet/active play) and infant location (e.g., daycare, home). Combined average ankle and wrist vector magnitude count (VMC) values were used as PA indicator. Statistical analyses were performed using two factor repeated measures (group x time) ANOVA between normal weight and overweight/obese infant. **RESULTS:** VMC values for the visits were: 1st visit=5486574, 2nd visit=5726418, and 3rd visit=5432360 for normal weight infants and 1st visit=5628067, 2nd visit=5743573, and 3rd visit=5103728 for overweight infants. There was no significant main effects of weight ($F(1, 28)=.004$, $p=.948$) and time ($F(2,28)=.271$, $p=.765$) and no significant interaction ($F(2,28)=.413$, $p=.665$) was found between group x time. **Conclusion:** Efforts are needed to quantify infant activity level in order to identify infants who may be at risk for developmental delay. Further research should employ larger samples in order to acquire more variation in PA level and other interested outcomes such as breastfed and formula-fed infants.



Photo Credit: Ryan Henrikson

INTRODUCTION

Approximately 10% of infants and toddlers in the U.S. are already overweight. The first year of a child’s life can make a significant impact on his/her long-term health, as rapid increases in weight during the first 6 months have been associated with increased risk for obesity at age 3. One modifiable factor that may impact weight is physical activity (PA). Historically, society has thought that infants (0-1 year of age) are “active enough” and not in need of efforts to promote PA to expend energy. However, increases in technology have led to less PA in children of all ages. Specifically in infants, 40% of 3-month olds regularly watch TV or videos and may spend up to 60 hours a week in restrictive devices such as high chairs or car seats limiting their ability to be active. There is a vital need to understand the amount of PA that contributes to healthy development. Therefore, the purpose of this study was to determine the level of PA in normal weight and overweight infants.

METHODS

- Participants were part of a pilot study examining infant PA and postural control in normal weight (n=21) and overweight (n=9) infants.
- Data were collected at 3 time points: 3 months of age, the onset of sitting (~5 months), and one month post onset of sitting (~6 months).
- Weight and length were measured by trained researchers using standardized procedures. Infants with a weight-for-length z-score $\geq 90^{\text{th}}$ percentile at visit 1 were classified as overweight.
 - Average weight-for-length z-score for normal weight infants was 50.6 ± 25.0
 - Average weight-for-length z-score for normal weight infants was 97.4 ± 2.1
- Infants wore Actigraph GT9X Link accelerometers for four days (2 weekdays, 2 weekend days) on the left wrist and ankle.
- Parents completed a time activity diary to document infant activity-level (sleeping, eating, quiet/active play), child’s location (e.g., home, daycare), time spent in restrictive devices (e.g., car seat, wrap), and caregiver interaction for each hour throughout the day.
- A majority of infants were male, (73.3%), white (79.3%), and breastfed for ≥ 6 months (76%).
- Vector magnitude count (VMC) values were used as a PA indicator
- Statistical analyses were performed using two factor repeated measures (group x time) ANOVA between normal weight and overweight/obese infant.

RESULTS

- Combined average VMCs for normal weight infants were: 1st visit=5486574, 2nd visit=5726418, 3rd visit=5432360.
- Combined average VMCs for overweight infants were: 1st visit=5628067, 2nd visit=5743573, 3rd visit=5103728.
- There was no significant main effects of weight ($F(1, 28)=.004$, $p=.948$) and time ($F(2,28)=.271$, $p=.765$) and no significant interaction ($F(2,28)=.413$, $p=.665$) was found between group x time.

Table 1. Average Daily VMCs



Summary and Conclusion

Although there appeared to be a reduction in PA from visit 2 to visit 3 and differences in PA at visit 3 between normal weight and overweight infants, these findings were not significant. Future research is needed to examine if significant differences are found during the attainment of other motor milestones (e.g., standing, walking). Additionally due to the importance of PA for motor skill development in childhood, future efforts are needed to validate objective measures of PA in infants in order to identify infants who may be at risk for development delays. Future research could also examine differences between breastfed and formula fed infants as research suggests formula fed infants may be at an increased risk for motor development delays.

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