

# Use of Heart Rate Monitors in a Physical Activity Program for Children With Fetal Alcohol Spectrum Disorder



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## Introduction

- Health Canada estimates that 9 of every 1000 infants is born with Fetal Alcohol Spectrum Disorder (FASD)
- FASD is an umbrella term that describes a range of physical and neuropsychological effects that are caused by prenatal exposure to alcohol
- Effects include poor coordination, sensory issues, poor problem solving ability, and behavioural problems, that lead to challenges for the child at home, in school or the community
- Exercise has been shown in animal models to improve some of the deficits associated with prenatal alcohol exposure
- FAST Club is an exercise-based intervention program for children with FASD that aims to improve physical and neuropsychological deficits through fun physical activities
- Health, fitness and exercise intensity are commonly inferred from a persons Heart Rate (HR), which can be easily monitored using a small HR monitor
- In addition, decreased heart rate variability (HRV), which is the variations in time between each heart beat, is correlated with stress, which may be a factor that contributes to depression and other mental health disorders that children with FASD are prone to
- We have recently developed a more exercise-intense (moderate-vigorous intensity) version of FAST Club, with the aim of increasing the effects of the program on physical and neuropsychological function

### PURPOSE

- The purpose of this study was to pilot the use of HR monitors in children with FASD during the FAST Club program. Sensory issues are common in children with FASD, therefore wearing HR monitors may not be well tolerated

## Objectives

Our specific objectives were to determine if HR monitors:

- Can be used effectively in this population of children
- Can be used to determine the average intensity of the exercise performed during the program

## Methods

- 13 children, ages 7-11 y, participated in the program which ran twice a week for 1 hour/session for 12 weeks
- During a FAST Club session, children rotated through activities that focused on various skills, such as running speed and agility, strength, balance etc.
- Children warmed up for their activities at the beginning of a session, then had the HR monitor strapped on around their chest (H7 Polar HR monitors)
- Children performed their various activities throughout the session while the HR data was sent to an iPad in real time wirelessly
- Children were able to remove the HR monitor whenever they wanted
- Children were told that the aim was to maintain their HR within a target range of 70-90% of their maximum HR (target HR between 147-189 BPM), which corresponds to moderate/vigorous intensity
- HR readings were projected on an iPad app, allowing us and the children to see what their HR was and how long they had maintained the target HR for
- Every 10 minutes they spent within the target range they gained a virtual medal which helped to motivate the children to stay active
- At the end of the sessions, the data was converted into a chart that showed how HR changed over the course of the session and how many calories they had burned

## Results

- 7 of the 13 children were willing to wear the HR monitors consistently, but only for an average of 35 min/session
  - Several children would try the HR monitors but lose interest or get uncomfortable part way through a session and ask to have it removed
- Data was collected from children who wore their HR monitors for 20 minutes or more on average individually
- For these children, average HR was 109 BPM over an entire session (including rest breaks), with an average max recorded HR of 198 BPM
  - The inclusion of the rest periods likely brought down the average HR causing it to be below the target range of 147-189 BPM
  - Normal HR max for children 7-11 y is ~210 BPM with a resting HR that ranges from 60-100 BPM
- The average time spent at the target of 70-90% HR maximum was 16.5 minutes, but individual results varied widely (2 to 44 minutes)
  - This was due to the variability in time the children spent wearing the monitors (6 – 68 min), and at which point during the session they would decide to wear them

## Acknowledgments

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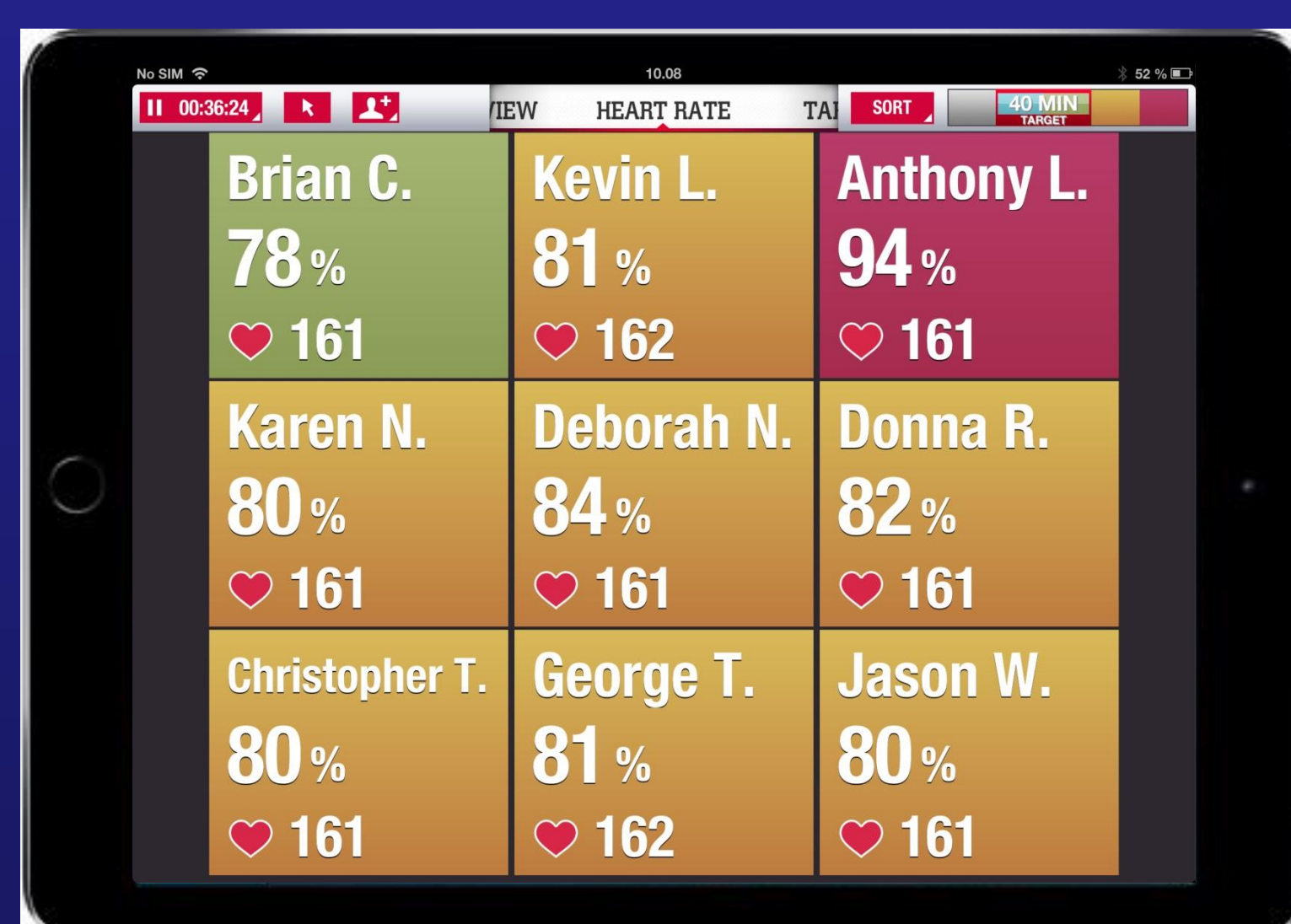
## Discussion

- The Polar HR monitors proved to be a great tool for measuring intensity of activity during the FAST Club session, when the children were willing to wear the monitors consistently
  - As expected, challenges were faced with getting the children to keep the monitors on, which led to issues in accurately determining the intensity of the program
  - Some target zone times were short due to some children only wanting to wear the monitors for a few minutes at a time
  - In future studies more comfortable monitors, such as a wrist watch, might be utilized in order to convince more children to take part and provide a more accurate assessment of the intensity of the program
- Monitors were worn during rest periods which caused the average HR during each session to be lower than anticipated
  - Unfortunately the software for the HR monitors did not allow manipulation of data to separate rest from active periods
  - The use of a wrist watch monitor could help due to it being easier to turn on and off when a rest period starts and stops for each child
- The medal system was found to be excellent in motivating the children with HR monitors to maintain their activity
  - Children would frequently check the iPad to see how close they were to their next medal, then quickly move to their next activity to try to get the medal
  - Monitoring HR could be a great way to keep kids active through gym class, as studies have shown that children only have a HR above 60% HR max for 13.2 minutes of a P.E. period, which is far less than the recommended 60 min/d



## Future Directions

- In future studies we hope to measure improvements in fitness from participation in the FAST Club program through:
  - Pre and post measurements of resting HR
    - A decrease in resting HR has been shown to be an easy measure of a general increase in aerobic fitness
  - Pre and post measurement of HR during specific fitness tests
    - Similar to resting HR, we can infer improvements in fitness from a decrease in HR for the same intensity of work on a specific test
- We also hope to use these monitors to measure the average HR children will attain during specific activities of the program, to establish the average intensity of the activities and the change in fitness over the length of the program
- Lastly, with more advanced software we hope to measure HRV to determine if HRV is decreased in children with FASD



Example Image of PolarGoFit HR Chart (Not from participant)