THE ACCURACY OF WIRELESS 3-D MOTION SENSORS IN DETECTING THE LEG MOVEMENTS OF YOUNG INFANTS: A PILOT STUDY

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BACKGROUND AND PURPOSE: Infant leg movements (LMs) are important behaviors to study because they are related to when babies learn to walk. Video-based behavior coding is the ‘gold-standard’ for identifying infant LMs. Little research has been conducted to determine if 3-D motion sensors can accurately detect LMs produced by young infants. The purpose of this study was to compare the accuracy of 3-D sensors to behavior coded video-taped data to identify the LMs produced by pre-walking infants.

METHODS AND MATERIALS: The LMs of 4 typically developing (TD) infants were video-taped in supine with and without the 3-D sensors attached to their thighs and shanks for 4 consecutive months. The video-taped data was behavior coded to identify each infant’s LMs in each condition. Matlab programs based on the mean peak acceleration and velocity of the infants’ LMs were written to identify LMs detected by the 3-D sensors.

ANALYSIS: One-way ANOVAs followed by Bonferroni corrections were used to compare the frequency of LMs generated each month in each condition. The percent agreement between the LMs detected by the sensors compared to the behavior coded LMs was calculated at each age.

RESULTS: Wearing the 3-D sensors did not result in a significant change in the number of LMs generated by this small group of infants (p < .05). Three algorithms using the peak acceleration and velocity of the infants’ LMs were developed and revealed the 3-D sensors detected 89% to 93% of the LMs identified through behavior coding the video-taped data.

CONCLUSIONS: These preliminary results suggest wearing 3-D sensors does not reduce how often infants move their legs and that they can be used accurately to detect infant LMs.

IMPLICATIONS: Based on this data, we hope to collect additional data and develop algorithms that will enable parents of infants with disabilities to use 3-D sensors to track their baby’s LMs over time.