



# ***Validation of wrist-worn accelerometers in children***

## **PARTICIPANT INFORMATION SHEET**

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### **Researcher Introduction**

We are researchers from Massey University, AUT and University of Canterbury with expertise in physical activity measurement in adults and children.

### **Invitation to Participate in Research Study**

Accurate physical activity assessment is important in monitoring daily levels of physical activity, and to assess the effectiveness of physical activity interventions in research. Typically, accelerometers (small movement sensing devices like pedometers) are worn for a set period of time to record physical movement. Previously, accelerometers were mainly worn on the hip, however recent studies have reported increased compliance with wrist-worn devices, mainly due to comfort. Related to compliance, the issue of lost accelerometers, which is high in any study but is typically significantly higher among children. Whilst numerous algorithms are available for adult wrist-worn data, there are currently no validated algorithms available for processing data acquired from the wrist (other body locations) in children. As a result, studies in children continue to either place devices on the hip compromising compliance, or process data using inappropriate or unvalidated algorithms compromising data quality.

Therefore, the aim of this study is to compare two different accelerometer types and validate them with hip-worn accelerometers and to produce specific algorithms for wrist-worn accelerometers in children.

### **Participant Recruitment**

We are collecting data from students from Kauri Park School (Years 1-6) and Birkdale Intermediate School (Years 7-8). The study is split into two parts: Part A and Part B. We would like 160 students for Part A (i.e., 20 students from each year group) and, from this group of students, we would like a further 75 students (i.e., 25 from each of three year-ranges, Years 1-3, 4-6, and 7-8) for Part B. Biomechanical differences that affect accelerometer outputs mean that children with restricted ambulatory movement are ineligible for the study.

### **Project Procedures and Participant Involvement**

#### **Part A: 7-day accelerometry assessment**

If you agree for your child to take part, they will be asked to wear two accelerometers for seven days: a watch-like device on their wrist; and another device on their hip on an elastic belt. These devices contain accelerometers which record movement and allow the research team to accurately record physical activity (amount, intensity, duration, and patterns of activity). The wrist-worn device should remain in place for the full 7-day duration, including during sleep time (as well as shower/bath time and swimming). The hip-worn device will need to be taken off before bed and then replaced on the hip in the morning (as well as before and after shower/bath time and swimming). We will provide a sleep diary for you to log when the unit is taken off (before bedtime) and put back on (in the morning) to discount this overnight data.

The devices will be fitted by a member of the research team. We will also show your child how to put on the device and provide a set of instructions for parents and caregivers (and make this information available for teachers as well) in case the device must be removed at any stage (e.g., for sports like rugby). Research

assistants will go back the following week to collect the accelerometers from students. When your child returns the devices, they will receive a koha (\$10 Westfield voucher) as a token of our appreciation.

### **Part B: Comparing accelerometry with energy expenditure and between different accelerometers**

If you agree for your child to participate in Part B of the study, data collection to compare energy expenditure against accelerometer counts and established metabolic equivalents of various tasks will be conducted on school grounds. You will be required to complete a pre-exercise screening questionnaire on behalf of your child to ensure they are fit to participate. Students will be required for 70-85 minutes, within school hours, to perform a prescribed series of activities while data are collected. Your child will be fitted with four accelerometers (wrist, hip, lower back and mid-thigh, the latter two being enclosed in a foam pouch fixed with hypoallergenic medical-grade tape), as well as a chest strap to measure heart rate and a respiratory face mask to measure expired air to determine energy expenditure. Activities include, lying still, sitting still reading, sitting at a desk writing or typing, walking (slow and brisk), running (slow and medium), throwing and catching with a ball, and riding a scooter. Older children (>7 years and capable of completing the tasks) may also shoot basketball hoops and retrieve the ball, dribble a soccer ball, and ride a bicycle. Activities will start with 10 minutes of lying down followed by 5 minutes of each activity with a 2-minute transition and rest period between activities. At the end of the testing your child will receive a koha (\$10 Westfield voucher) as a token of our appreciation.



### **Participant's Rights**

You are under no obligation to accept this invitation. If you give consent for your child to participate, they have the right to:

- decline to answer any particular question
- withdraw from the study at any time, even after you have signed a consent form (if you or your child choose to withdraw you/they cannot withdraw their data from the analysis after data collection has been completed)
- ask any questions about the study at any time during participation
- provide information on the understanding that their name will not be used in any publications
- be given access to a summary of the project findings when it is concluded

### **Good Practice and Cultural Safety for Massey University Research**

We have considered the inclusion of Māori and indigenous values and concepts, allowing for the use of whānau support and appropriate Māori protocols. We acknowledge the concept of manaakitanga, respecting the participant's inherent dignity and acting in a caring manner towards them by way of:

- Taking full responsibility to perform research in a safe and ethical manner (aroha)
- Providing the participant with all of the critical information regarding the study in a clear way, so they can make informed decisions (tūmanako and whakapono)
- Awareness of cultural significance and sensitivity of culturally safe implementation of the study (māhaki)
- Respect for the privacy and confidentiality of Māori participants

## Confidentiality

All data collected will be used solely for evaluation and research purposes. Reports will be provided to the schools and may be presented at conferences and submitted for publication in journals. All personal information will be kept confidential by assigning numbers to each participant. No names will be visible on any papers on which you provide information. All data/information will be dealt with confidentiality and will be stored in a secure location for five years on the Massey University Albany Campus. After this time, it will be disposed of by an appropriate staff member from the School of Sport, Exercise and Nutrition.

## Project Contacts

If you have any questions regarding this study, please do not hesitate to contact any of the following people for assistance:

- Prof Ajmol Ali (School of Sport, Exercise and Nutrition, Massey University)  
[a.ali@massey.ac.nz](mailto:a.ali@massey.ac.nz) (09) 213 6414
- Mr Owen Mugridge (School of Sport, Exercise and Nutrition, Massey University)  
[o.mugridge@massey.ac.nz](mailto:o.mugridge@massey.ac.nz) (09) 213 6650
- Julia McPhee (School of Sport and Recreation, Auckland University of Technology)  
[julia.mcphee@aut.ac.nz](mailto:julia.mcphee@aut.ac.nz) 021 717 734
- Dr Arindam Basu (School of Health Sciences, University of Canterbury)  
[arindam.basu@canterbury.ac.nz](mailto:arindam.basu@canterbury.ac.nz) (03) 369 3509

## Helplines for children and young people

- Youthline – 0800 376 633, free text 234 or email [talk@youthline.co.nz](mailto:talk@youthline.co.nz) or online chat
- What's Up – 0800 942 8787 (for 5–18-year olds). Phone counselling is available Monday to Friday, 12noon–11pm and weekends, 3pm–11pm. Online chat is available from 3pm–10pm, 7 days a week, including all public holidays.
- Kidslines – 0800 54 37 54 (0800 kidslines) for young people up to 18 years of age. Open 24/7.

## Committee Approval Statement

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern A, Application 22/30. If you have any concerns about the conduct of this research, please contact Dr Negar Partow, Chair, Massey University Human Ethics Committee: Southern A, telephone 04 801 5799 x 63363, email [humanethicsoutha@massey.ac.nz](mailto:humanethicsoutha@massey.ac.nz).

## Compensation for Injury

If physical injury results from your participation in this study, you should visit a treatment provider to make a claim to ACC as soon as possible. ACC cover and entitlements are not automatic, and your claim will be assessed by ACC in accordance with the Accident Compensation Act 2001. If your claim is accepted, ACC must inform you of your entitlements, and must help you access those entitlements. Entitlements may include, but not be limited to, treatment costs, travel costs for rehabilitation, loss of earnings, and/or lump sum for permanent impairment. Compensation for mental trauma may also be included, but only if this is incurred as a result of physical injury.

If your ACC claim is not accepted, you should immediately contact the researcher. The researcher will initiate processes to ensure you receive compensation equivalent to that to which you would have been entitled had ACC accepted your claim.