

- A partnership of public health researchers across the five universities in North East England
- Working with policy makers and practice partners to improve health and wellbeing and tackle inequalities
- A founding member of the NIHR School for Public Health Research (SPHR)

## How should we measure physical activity and sedentary behaviour of pre-school aged children?

Physical activity and sedentary behaviour are linked to the health and development of young children. Accurate measurement of these behaviours underpins research and practice in this area. Here we present key findings from our review examining the measurement tools used to assess physical activity and sedentary behaviour of pre-school children (aged 3-7 years).

This project aimed to determine which tools are most **valid** (accurately measures the behaviour), **reliable** (is consistent at measuring the behaviour), and **feasible** (can be successfully used) for measuring physical activity and sedentary behaviour of pre-school aged children. To do this we conducted extensive searches of the available research on this topic (a systematic review) and combined the results of these existing studies. These methods allowed us to determine which tools are most useful for which outcome measures.

There are many different ways in which the physical activity (PA) and sedentary behaviour (SB) of pre-school aged children can be measured, these include:

**Diaries and questionnaires** – Parents or carers report the PA and SB of their children using prescribed questions.

**Devices** – There are a range of different devices used to measure PA and SB. Here, we focus on accelerometers which measure movement and sometimes include integrated heart rate monitors. Pictured is a young child wearing a model called the 'Actigraph GT3X'.

**Direct observation** – Children are observed for a period of time, usually at nursery, and their movement behaviours recorded.

**Calorimetry** – Identifies how much energy a child expends during various activities. This can be through several methods, including a controlled room called a calorimeter chamber, through portable machines or doubly labelled water (a technique used to measure the energy a child burns based on the carbon dioxide they breathe out).

### Key findings

- Questionnaires show some (but limited) evidence of validity and reliability. However, much more research focusing on development (in particular with parents and carers of pre-school aged children) and evaluation of diaries and questionnaires is needed.
- Accelerometers, including the 'Actigraph' (pictured), can provide valid measures of movement-related behaviours that would be of interest in a range of research. However, different makes of accelerometers can produce different outcomes and should not be used interchangeably.
- Frequently worn activity devices such as 'Fitbits' also demonstrated promising results for a range of outcomes, and were shown to be reliable, but there was very little research on these tools in this age group.
- Although most accelerometers were feasible, high proportions of missing data from devices malfunctioning and breaking or from children not wearing the monitors was reported. The 'ActivPAL', attached to the thigh using an adhesive dressing, had some feasibility concerns due to irritation to the skin.
- Direct observation and calorimetry may be suitable for small-scale structured measurement, but are not feasible for assessing everyday activity for public health/population level research.
- Using an accelerometer alongside a questionnaire/diary, may be most useful for a range of outcome measures.
- Findings support the need for more qualitative research, such as focus groups and interviews, to understand acceptability and feasibility of the tools from the perspective of participants, to determine reasons for missing data, non-completion, and overall enjoyment.



## Policy relevance and implications

- Research suggests that using different tools to record physical activity and sedentary behaviour of pre-school children (aged 3-7 years) can impact substantially on measurement outcomes.
- Consideration is needed when interpreting and understanding the results of research/data that are used to inform policy and practice, based on the measurement tools used.
- Using tools with good validity, reliability, and feasibility is important to develop appropriate policies and programmes to change behaviours. As well as for conducting evaluations, to identify if there are any changes as a result of the policies/programmes in place.
- New tools developed to measure the physical activity and sedentary behaviour of pre-school children should be thoroughly evaluated in the group of interest (e.g. based on geographical location, specific age group) prior to use, to ensure validity, reliability and feasibility.

*“Using different tools to record physical activity and sedentary behaviour of pre-school children can impact substantially on measurement outcomes”*

## BRIEF DESCRIPTION OF THE RESEARCH

This Fuse research brief presents key findings from a systematic review to examine the validity, reliability, and feasibility of measurement tools used to assess physical activity and sedentary behaviour of pre-school aged children. The research was led by Sophie Phillips, Fuse and NIHR School for Public Health Research (SPHR) funded PhD Researcher.

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