



Physical activity measurement in children by parental self report

Prepared for

NSW Department of Health

January 2004

Report No. CPAH 04-0001

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Currently, we are not able to accurately estimate the proportion of infants and children in NSW who are sufficiently physically active because population-wide measurement of participation in physical activity is so difficult. In assessing physical activity among children, the 'accuracy-practicality' trade-off presents a more challenging predicament than for physical activity assessment among adults. The only method with acceptable cost is to ask respondents to self-report their physical activity behaviour, although children less than 10 years of age are unable to accurately or reliably report their activity patterns (Saris, 1985). One possibility for estimating levels of physical activity in this age group is to question the parents of young children about their child's behaviour. Therefore, the purpose of this brief report is to provide an overview of previously used parental report measures for PA in children that may be suitable for use in population surveys.

Methods

A search of the current literature was conducted using the Medline database and the search terms 'physical activity', 'parental report' and 'children'. International experts in surveillance, health monitoring population surveys and measurement of PA were contacted regarding their current and previous techniques in population telephone surveys for children. Overseas discussions with the United States Centers for Disease Control and Prevention (CDC), Health Canada and coordinators of the Eurobarometer survey were also held. This work was targeted to telephone survey instruments, and therefore excluded validated and objective measurements (fitness tests such as the 'shuttle run test', wearing motion sensors such as accelerometers, etc), as these measures are not suitable for use in population telephone surveys.

Findings and Recommendations

Sirard and Pate (2001) provide a review of proxy-reports of physical activity in their review of the strengths and limitations of physical activity assessment techniques for children and adolescents. Overall, they conclude that there is limited evidence available for the validity of proxy reporting by either parents or teachers. One study has compared 6-item surveys of single-day physical activity completed by parents and teachers, with direct observation of children aged 3-5 years and found little or no correlation (Noland et al, 1990). Another study, however, using 3-day parental reports for 6-year old children showed high validity against heart rate measures of physical activity (Spearman $r = 0.72-0.82$) (Manios et al, 1998). The self-report measures used in this study were based on a diary completed by parents on consecutive days and are therefore inappropriate for use in a cross-sectional telephone survey.

A Dublin study of physical activity levels among second class students (7-9 years old) asked parents to complete a modified version of the Modifiable Activity Questionnaire for Adolescents (Hussey, Gormley & Bell, 2001). The questionnaire included separate items about the number of times in the preceding two weeks that the child had participated in at least 20 minutes of hard exercise (resulting in heavy breathing/fast heart beat) and light exercise (not resulting in heavy breathing/fast heart beat), as well as questions about the number of hours per day spent watching TV, videos or playing computer games. Parents were also asked to indicate which activities the child had participated in regularly during the previous year and the number of months during the year, average days per week and average minutes per day that the child performed each activity. This information was used to calculate the average hours per week spent in each activity which was then multiplied by the estimated metabolic cost of each activity to determine whether a level of sufficient weekly energy expenditure (based on 30 mins per day for four days per week at an intensity of 7 METS) was reached.

Although the authors claim their findings are similar to those in other published reports of physical activity among children in similar populations (including gender differences in estimated activity levels) and the reproducibility and validity of the original questionnaire (self-reported by adolescents) had been previously established, there is no evidence of its validity or reliability for parental proxy reporting in this younger age group. The only modifications for use by Hussey and colleagues (2001) included an additional item on transport to school and removal of items on involvement in competitive activities. In addition, the validity of this survey for estimating total activity in children may be compromised because questions about active play and other unstructured physical activities were not asked. Although this type of activity may be more difficult for parents to accurately report, it may comprise a large amount of the total physical activity engaged in by children of this age.

Harro (1997) conducted a study in Estonian children aged 4-8 years to validate a physical activity questionnaire completed by parents (out-of-school physical activity) and teachers (in-school activity) against objective measures of physical activity (heart rate and accelerometer). Parents reported the duration in minutes of the child's indoor and outdoor activities at home, and reported separately on low to moderate intensity activities (no heavy breathing) and moderate to vigorous activity (causing the child to breathe hard, and expected to increase heart rate to more than 140 beats per minute). There was moderate correlation between time spent in moderate or vigorous physical activity and total time with increased heart rate ($r = 0.4$) and accelerometer score ($r = 0.53$), which was comparable or better than the correlation found between increased heart rate and accelerometer score ($r = 0.41-0.45$). The author argues that such findings indicate that parent and teacher reports of moderate/vigorous physical activity for children of this age is as reliable as self-completed or interviewer administered reports in older children (Harro, 1997). However, the validity of this method has only been

established using both parent and teacher reporting. In addition, the questions were completed daily over four days in this validation study and the effect of retrospective recall using this measure has not been tested

Internationally, information from those involved in health surveillance of children and population measurement of physical activity among children revealed no current usage of parental proxy reporting. The Canadian Health Survey formerly used parental proxy reporting, but has ceased to measure child's PA upon assessing the measures as invalid and unreliable (Craig, 2003; personal communication). There are currently no population telephone surveys being conducted in the US that include self-report (including parental proxy) measures of PA among children (Pratt, 2003; personal communication), due to inadequate validity and reliability of self-report measures for younger children.

However, increasing validity of reporting by children themselves has been demonstrated in the US, with reasonably reliable estimates of PA from self-reports of children aged 11 years or more when administered in a classroom setting (Sallis, Buono et al, 1993; Sallis, Condon, et al, 1993). Since more accurate self-report measures exist for older children and adolescents, the population measurement of PA in this older age group should be approached separately from that for younger children. Currently, accelerometers and 'So Fit So Play' measures have been deemed the most valid for children, but neither is appropriate for CATI surveys.

Generally, self-report measures of physical activity in children have produced estimated activity levels that are consistently higher than those reported with other instruments (Welk, Corbin & Dale, 2000). This may be due to a number of factors, including exaggerated perceptions (by either child or parent) of the time and effort involved in children's physical activities and the sporadic

nature of children's activity patterns that causes difficulties in accurate recall of total time being active.

Future development of any parental proxy self-report measures of children's physical activity for use in population surveys should attempt to allow classification of sufficient and insufficient activity levels for good health. These cut points need to be developed and defined for young children. Welk and colleagues (2000) suggest that an appropriate criterion for children may be the proportion that report "2-3 bouts of short, intermittent activity totaling 30-60 minutes on at least 5 days a week" (p. 65), and that measurement based on one or two isolated days is likely to be insufficient for estimating true habitual activity patterns. Quantification of children's physical activity levels based on self-report should attempt to account for the type and purpose of activity (travel, recreational, etc), the intensity, the duration of each bout of activity and the frequency of participation (for example, sessions per week). For children, it may be more necessary to make clear distinction between structured exercise and participation in other physical activities for measurement purposes. Patterns of physical activity observed in children are very different from those among adults, so it may be difficult for parents to accurately translate qualitative knowledge of the habitual activities engaged in by children into the quantitative assessments required (Goran, 1998).

The majority of studies to validate proxy reporting of children's total physical activity have incorporated assessments by both teachers and parents, a methodology which is not transferable to population household telephone surveys. It must be noted that parental proxy reports of children's participation in physical activity will be limited by the parent's opportunity to observe their child engaging in activity, in addition to the standard potential biases that accompany any self-report measurement (recall, social desirability, mutual understanding of the meaning of questions by researcher and participant, etc.). However, the use of parental proxy reporting for assessing physical

activity levels may be a promising strategy for estimating population-wide activity levels of children if a valid and reliable instrument can be developed. More research is required to understand the daily patterns of participation in physical activity among younger children, which physical activities should be accounted for in estimating total physical activity levels as they relate to health benefits and parental awareness of the frequency and duration of such activities among their children.

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