

The reliability of the Adolescent Sedentary Activity Questionnaire (ASAQ)

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Abstract

Objective. To determine the test–retest reliability of a self-report questionnaire (the Adolescent Sedentary Activities Questionnaire; ASAQ) which assesses the time spent in a comprehensive range of sedentary activities, among school-aged young people.

Method. Two-hundred and fifty school students aged 11–15 years from four primary and four high schools in metropolitan Sydney (New South Wales, Australia) completed the questionnaire under the same conditions on two occasions, 2 weeks apart during Autumn, 2002.

Results. Test–retest correlations for time total spent in sedentary behavior were ≥ 0.70 , except for Grade 6 boys (Intraclass correlation coefficient (ICC)=0.57, 95%CI: 0.25, 0.76). Repeatability was generally higher on week days compared with week end days. ICC values for travel and social activities tended to be lower than for the other categories of sedentary behavior. There was little difference in the reliability across age groups.

Conclusions. ASAQ has good to excellent reliability in the measurement of a broad range of sedentary behaviors among young people. ASAQ has good face validity, but further validity testing is required to provide a complete assessment of the instrument.

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Keywords: Child; Reliability; Intraclass correlation coefficient; Inactivity

Introduction

Physical inactivity is a risk factor for a wide range of health problems (President's Council on Physical Fitness and Sports et al., 1998) so is a topic of strong research interest. There are concerns that young people are more sedentary than previous generations (Hill et al., 2003) and the development of reliable self-report measures of sedentary behavior is important for public health research.

Small screen recreation (SSR) is the primary contributor to total time spent in sedentary behaviors among young people in developing economies (Currie, 2004), but young people also engage in many other sedentary activities (Must and Tybor, 2005). Measures which are limited to television-viewing and computer use will, therefore, underestimate the time spent being sedentary. Although some instruments measure time spent in a number of sedentary behaviors, there are no dedicated self-report questionnaires that measure time spent in a comprehensive range

of sedentary behaviors among young people. This study reports the test–retest reliability of a self-report questionnaire (the Adolescent Sedentary Activities Questionnaire; ASAQ) which assesses the time spent in a comprehensive range of sedentary activities, among school-aged children, outside of school hours.

Methods

Participants

Four primary and four high schools were selected at random from schools in Sydney (New South Wales, Australia). One class of students in Grades 6, 8 and 10 were invited to participate in the study. The questionnaire was administered on two occasions, 2 weeks apart, in each school during March/April 2004 (Autumn).

Questionnaire development

Sedentariness comprises a range of activities where energy expenditure is less than 1.5 metabolic equivalents (METs) (Ainsworth et al., 2000). As with physical activity, it is not feasible to measure *all* instances of inactivity (e.g., time spent waiting in a queue or for transport, personal hygiene). There are, however, specific domains of inactivity that demonstrate both content and face validity: that is where activities are performed either sitting or lying down and body movement is minimal. The ASAQ items were developed by reference to

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Table 1
Categories and components of ASAQ

Sedentary category	Sedentary activity
Small screen recreation (SSR)	Watching TV Watching videos/DVDs; playing video games Using a computer for fun, including e-communications, e-games, surfing the net
Education	Using a computer for homework Doing homework not on a computer Out-of-school-hours tutoring
Travel	Motorized travel (car/bus/train/boat)
Cultural activities	Reading for fun Doing hobbies or crafts, including board or card games Playing/practicing a musical instrument
Social activities	Sitting around chatting with friends, using the telephone, hanging out, listening to music) Religious activities

adolescents' parents (acquaintances of the investigators), a group of adolescents and the literature (Fitzgerald et al., 1995; Larson and Verma, 1999; McHale et al., 2001; Raffaelli and Duckett, 1989; Silbereisen, 2001; Steinberg, 2001). Activities identified included watching television/videos/DVDs, computers, e-games and e-communication, study, reading, sitting with friends, telephone use, listening or playing music, motorized travel, hobbies and crafts, all performed out of school hours. The questionnaire was pilot tested with two school classes of adolescents.

Measures

Students were asked to think about a normal week, during school term, and to report how long they usually spent engaged in 11 different sedentary behaviors before and after school on each day of the week and on each day of the weekend. If two activities occurred at the same time (e.g., one hour in front of

the television doing homework) the students were asked to estimate how much time was spent on each activity during that time (e.g., 45 min television and 15 min homework). Five categories of sedentary behavior were created (see Table 1). Time spent in each category was calculated and time was also summed across categories to yield the total time per week spent in sedentary behavior. Students were asked to report their sex and date of birth.

Data analysis

Data were analyzed using SPSS V14.0 (Chicago, IL, USA). Time spent in each category of sedentary behavior and total time being sedentary were calculated for weekdays, weekend days and all days and intraclass correlation coefficients (ICCs) and 95% confidence intervals (95%CI) were calculated for boys and girls in each Grade. The values of the ICCs were characterized as follows: poor agreement (<0.40), fair to good agreement (0.40–0.75) and excellent agreement beyond chance (>0.75) (Landis and Koch, 1977).

Results

Two hundred and fifty students participated in the study (Grade 6=98; Grade 8=73 and Grade 10=79). The mean age of students in Grades 6, 8 and 10 was 11.3 years, 13.3 years and 15.3 years, respectively.

Table 2 shows the values of the ICCs (95%CI) for each category of sedentary behavior and total time being sedentary for weekdays, weekend days and all days by sex and Grade. The ICC values for total time spent in sedentary behaviors were all ≥ 0.70 , except for Grade 6 boys. ICC values were high among all students for SSR, education and cultural sedentary activities with only one or two exceptions. Although the values for travel and social activities tended to be lower than for the other categories of sedentary behavior, all except one of the values were >0.40 . The ICC values for weekend days tended to be lower than weekdays with the exception of high school girls.

Face validity was determined by pilot testing the questionnaire with a group of approximately 50 students (mean age 12 years) who reported that they engaged in all of the activities, but no other on a regular basis.

Table 2
Intraclass correlation coefficients and 95% confidence intervals (ICC; 95%CI) for sedentary behavior for week, weekday and weekend days among boys and girls by category and Grade^a

	Grade 6		Grade 8		Grade 10	
	Boys (n=50)	Girls (n=48)	Boys (n=39)	Girls (n=34)	Boys (n=50)	Girls (n=29)
<i>Week</i>						
Total	0.57 (0.25, 0.76)	0.86 (0.75, 0.92)	0.84 (0.69, 0.91)	0.70 (0.40, 0.85)	0.72 (0.52, 0.84)	0.82 (0.63, 0.92)
SSR ^b	0.81 (0.66, 0.89)	0.76 (0.57, 0.87)	0.90 (0.82, 0.95)	0.78 (0.57, 0.89)	0.79 (0.63, 0.88)	0.90 (0.78, 0.95)
Education	0.54 (0.19, 0.74)	0.68 (0.43, 0.82)	0.73 (0.48, 0.86)	0.72 (0.45, 0.86)	0.81 (0.67, 0.89)	0.88 (0.74, 0.94)
Cultural	0.82 (0.69, 0.90)	0.74 (0.55, 0.86)	0.72 (0.47, 0.85)	0.86 (0.73, 0.93)	0.77 (0.59, 0.87)	0.78 (0.54, 0.90)
Social	0.49 (0.11, 0.71)	0.81 (0.66, 0.89)	0.61 (0.27, 0.80)	0.42 (−0.15, 0.71)	0.72 (0.51, 0.84)	0.54 (0.03, 0.78)
Travel	0.59 (0.28, 0.77)	0.62 (0.33, 0.79)	0.68 (0.39, 0.83)	0.80 (0.61, 0.90)	0.25 (−0.31, 0.57)	0.93 (0.85, 0.97)
<i>Weekdays</i>						
Total	0.58 (0.27, 0.76)	0.82 (0.67, 0.90)	0.80 (0.63, 0.90)	0.60 (0.20, 0.80)	0.70 (0.46, 0.82)	0.79 (0.56, 0.90)
SSR	0.81 (0.67, 0.89)	0.73 (0.52, 0.85)	0.89 (0.78, 0.94)	0.66 (0.32, 0.83)	0.72 (0.50, 0.84)	0.84 (0.66, 0.92)
Education	0.47 (0.08, 0.70)	0.58 (0.25, 0.76)	0.71 (0.45, 0.85)	0.68 (0.35, 0.84)	0.76 (0.58, 0.86)	0.83 (0.64, 0.92)
Cultural	0.81 (0.67, 0.89)	0.76 (0.58, 0.87)	0.72 (0.46, 0.85)	0.88 (0.77, 0.94)	0.77 (0.60, 0.87)	0.68 (0.33, 0.85)
Social	0.35 (−0.14, 0.63)	0.74 (0.54, 0.86)	0.20 (−0.53, 0.58)	0.30 (−0.40, 0.65)	0.51 (0.15, 0.72)	0.57 (0.09, 0.80)
Travel	0.73 (0.53, 0.85)	0.72 (0.50, 0.84)	0.72 (0.48, 0.85)	0.82 (0.64, 0.91)	0.28 (−0.26, 0.59)	0.95 (0.89, 0.98)
<i>Weekend days</i>						
Total	0.47 (0.06, 0.70)	0.76 (0.57, 0.87)	0.70 (0.42, 0.84)	0.71 (0.42, 0.85)	0.67 (0.43, 0.81)	0.83 (0.63, 0.92)
SSR	0.65 (0.38, 0.80)	0.64 (0.36, 0.80)	0.76 (0.55, 0.88)	0.79 (0.59, 0.90)	0.71 (0.50, 0.84)	0.90 (0.79, 0.95)
Education	0.73 (0.52, 0.84)	0.76 (0.57, 0.86)	0.64 (0.32, 0.81)	0.73 (0.47, 0.87)	0.74 (0.55, 0.85)	0.81 (0.60, 0.91)
Cultural	0.66 (0.40, 0.81)	0.61 (0.31, 0.78)	0.55 (0.14, 0.76)	0.70 (0.40, 0.85)	0.67 (0.42, 0.81)	0.64 (0.24, 0.83)
Social	0.50 (0.13, 0.71)	0.71 (0.49, 0.84)	0.74 (0.50, 0.86)	0.38 (−0.22, 0.69)	0.70 (0.48, 0.83)	0.34 (−0.38, 0.70)
Travel	0.46 (0.05, 0.69)	0.65 (0.37, 0.81)	0.01 (−0.88, 0.46)	0.46 (−0.08, 0.73)	0.38 (−0.10, 0.65)	0.69 (0.35, 0.85)

^a Testing was conducted during Autumn 2002 in 4 primary and 4 high schools in metropolitan Sydney (New South Wales, Australia).

^b Small screen recreation (SSR).

Discussion

Overall, the results of this study suggest that the ASAQ has good to excellent reliability and can be considered a potentially useful measure of a comprehensive range of sedentary behaviors among young people. Furthermore, there was little difference in the reliability across age groups indicating that ASAQ is not age dependent.

Reliability was generally lower for social activities, travel and, except among high school girls, on weekends. There are two reasons for lower ICCs: poor reliability of reporting or the behavior being assessed is not very stable over time. Behaviors could be reported very accurately on both occasions of a test–retest, but there is poor agreement because the behavior was different on the two occasions. The amount of time spent in an activity is dependent upon other factors and activities such as social and travel may be quite variable, suggesting there is no such thing as a “typical” week day or weekend. This explanation is plausible for behaviors on weekend days: some weekends are active and others are quiet, especially if the weather is different on both occasions. The higher ICC values for week days compared with weekend days suggest behavioral variability rather than poor reliability. A particular strength of ASAQ was the high reliability for SSR, in which most sedentary time is spent (Hardy et al., 2006) and where the evidence is strongest for adverse health effects, and where specific guidelines exist (American Academy of Pediatrics: Committee on Public Education, 2001).

The criterion validation of sedentary behavior questionnaires remains a challenge. Observational studies among older children are problematic for ethical and cost reasons and because of the

potential for reactivity (Sallis and Owen, 1999). Accelerometers are an accepted tool for measuring human movement (Sirard and Pate, 2001) and cut–point values have been developed to identify sedentary behavior among young people (Puyau et al., 2002; Treuth et al., 2005). However, the substantial differences between published cut–point values are a cause for concern. Applying cut–points is problematic because data are typically collected in 1-min intervals and there is no consensus on the length of time which constitutes a “bout” of sedentariness. Thus, this approach includes all values (e.g., time spent standing in a queue or during an active game) which meet the cut–off criterion for inactivity. Consequently, accelerometers are unlikely to provide a reasonable measure of sedentary behaviors at present.

Inactivity can occur incidentally during the course of a day (e.g., waiting in a queue) and it is reasonable to assume that the recall of these events is poor and therefore these episodes are excluded in questionnaires which seek to assess habitual behavior.

ASAQ may have to be modified for use in other cultures (to include other prevalent sedentary activities) and may need to be reviewed over time as other activities become popular. Similarly, sedentary behavior may differ across season, so repeat administration during the year is recommended.

Conclusions

ASAQ has good test–retest reliability and until better methods of assessing criterion validity are developed, it appears to be the best available tool for assessing time spent in a range of sedentary behaviors among young people outside of school hours.

Appendix A. Adolescent Sedentary Activity Questionnaire (ASAQ)

14. Think about a normal school week, and write down how long you spend doing the following activities before and after school each day

Activity	Monday		Tuesday		Wednesday		Thursday		Friday	
	Hours	Minutes								
Watching TV?	<input type="text"/>									
Watching videos /DVDs?	<input type="text"/>									
Using the computer for fun?	<input type="text"/>									
Using the computer for doing homework?	<input type="text"/>									
Doing homework not on the computer?	<input type="text"/>									
Reading for fun?	<input type="text"/>									
Being tutored?	<input type="text"/>									
Travel (car/bus/train)?	<input type="text"/>									
Doing crafts or hobbies?	<input type="text"/>									
Sitting around (chatting with friends/ on the phone/chilling)?	<input type="text"/>									
Playing/practicing a musical instrument?	<input type="text"/>									

15. Think about a normal weekend, and write down how long you spend doing the following activities on the weekend

Activity	Saturday		Sunday	
	Hours	Minutes	Hours	Minutes
Watching TV?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Watching videos/DVDs?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Using the computer for fun?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Using the computer for doing homework?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Doing homework not on the computer?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Reading for fun?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Being tutored?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Travel (car/bus/train)?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Doing crafts or hobbies?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Sitting around (chatting with friends/on the phone/chilling)?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Playing/practicing a musical instrument?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Going to church or Saturday school?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

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