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ORIGINAL ARTICLE

Concurrent Validity and Test-Retest Reliability of the Greek Version of the 3-Day Physical Activity Record in 13-15 yrs old Greek Adolescents

Maria Michalopoulou, Thomas Kourtessis, Fotini Ioannidou , Nikolaos Aggelousis, & Andreas Avgerinos
Dept of Physical Education and Sport Sciences, Democritus University of Thrace

Abstract
The purpose of this study was to examine the validity and the reliability of the Greek version of the self-report instrument "3day Physical Activity Record" (3dPAR-G, Pavlidou, Michalopoulou, Aggeloussis & Taxildaris, 2009). Participants were 57 high school students (*Mean Age*=14.02 y., *SD*=0.72 y.). Concurrent validity was assessed against the accelerometer (MTI/Actigraph) whereas reliability was assessed through two consecutive measurements that were performed two weeks apart. Participants wore the MTI/ Actigraph for five consecutive days and completed the 3dPAR-G for the last three of those days. Significant correlation was observed between MTI/Actigraph raw counts and 3dPAR-G average score (METs min· day^{-1}, r = .41). Regarding reliability of the 3dPAR-G *the intraclass correlation coefficient* for total physical activity (MET/min. day^{-1}), was significant (ICC = .57, p < .01). Finally, in terms of internal consistency, Cronbach's alpha was estimated and was rather high (α = .81). Conclusively and within the limitations of the present study (small sample size, 5 days of objective physical activity monitoring), the results indicated that the 3dPAR-G is a valid and reliable instrument for assessing group-level reported physical activity in Greek adolescents aged 13-15 years.

Key Words: *Psychometric characteristics, 3dPAR-G, physical activity.*

Introduction

Physical activity (PA) is a complex behavior that can be performed in many specific ways, in numerous physical and social settings and for different purposes. As defined, PA comprises any bodily movement produced by skeletal muscles that expends energy beyond resting levels (Bouchard, Blair & Haskell, 2007). It is a very inclusive term since it includes occupational activities (walking or cycling for transportation), recreational activities (active play or learning motor skills), and exercise. Physical activity in children and youth includes walking to school and running in physical education class, performing household chores and playing soccer in the driveway, playing actively with siblings and competing on a swimming contest (Ward, Sunders & Pate, 2007). Additionally, it is performed across a remarkably wide range of intensities and even the same activity can be performed in different intensities.

Even though the significance of maintaining adequate level of PA though out life time is well documented and supported by the results of previous studies (Harsha, 1995; Sothern, Loftin, Suskin, Udall & Bleecker, 1999), the majority of young people decrease their PA as they grow older and young girls tend to be less active than young boys (Sallis, Prochaska & Taylor, 2000). The relation of PA to the health of children and adolescents and the belief that inactivity habits track to adulthood (Janz, Dawson & Mahoney, 2000) has led to increased interest in developing surveillance systems to assess PA participation and monitor compliance with PA guidelines in young people (Sallis, Taylor, Dowda, Freedson, & Pate, 2002). Measuring adolescent PA is difficult because of its complex and sporadic nature (Biddle, Sallis & Cavill, 1998; Welk, 2002). The need for valid and reliable tools has been well emphasized in the past, so that future researchers can accurately assess PA, compare their data, determine the association between health and PA and finally, determine compliance with PA guidelines.

Correspondence: Maria Michalopoulou, Dept of Physical Education and Sport Sciences, Democritus University of Thrace, Komotini 69100, Greece,
Email: michal@phyed.duth.gr

To date there are numerous different ways to measure and assess PA including self report questionnaires, daily logs, direct observation, accelerometry, pedometers and hart rate monitoring (Biddle et al., 1998; Dale, Welk & Matthews, 2002; Pate, Ross, Dowda, Trost & Sirard, 2003; Trost, Pate, Freedson, Sallis & Taylor, 2000). However, the psychometric characteristics of some of the above methods need to be further investigated especially regarding children and adolescents (Biddle et al.; Dale et al., 2002).

Further more, the problem of "pin-point accuracy" of instruments used in reporting physical activity (Stathi, Gillison, & Riddoch, 2009) limits the accuracy with which information on type, intensity and context of PA is extracted. According to recent studies, determining psychometric properties on both individual and group level (Corder van Sluijs, Wright, Whicup, Wareham & Ekelund, 2009; Troiano 2009) and validating the full potential of self-report instruments, will provide a better understanding of their strengths and weakness in assessing different dimensions of PA in more that one age group.

Self report instruments which are based on a time-use record is considered to be an acceptable method for collecting information related to the amount, content and patterns of PA during puberty (Matthews, 2002; Pate et al., 2003; Trost et al., 2000; Welk, 2002). However, as all subjective methods of assessment, self report instruments as daily activity records and logs have several limitations that need to be seriously considered before using them. Even though adolescents aged 10-16 years can provide reasonably reliable and valid reports of their daily PA over a 7-day period (Sallis, Buono, Roby, Micale & Nelson, 1993), the subjective nature of the method often leads to moderate, but acceptable, values of validity when tested against an accelerometer for children and adolescents (Dale et al., 2002; Kohl, Fulton & Caspersen, 2000; Schwarz, 1999). According to the results of a previous study conducted in Greece regarding psychometric characteristics of two self report questionnaires that included time-use format (one of which was used as a recall questionnaire and the other as a daily activity log), moderate but acceptable validity values were reported (r=.62 & r=.63, Argiropoulou, Michalopoulou, Aggeloussis & Avgerinos, 2004). On the other hand, very high reliability readings (ICC=.97 & ICC=.70) and high reliability values (ICC=0.97, p<.001 & ICC=.70, p<.01) were reported.

Contrary to the aforementioned limitations self report questionnaires that use either recall or daily log, carry numerous advantages which make them very popular instruments among population studies. Advantages include practicality, low cost, convenience, low or non reactivity, possibility of modification to obtain information for variables of interest as well as adaptability to cultural particularities (Argiropoulou et al., 2004; Freedson et al., 1997; Janz, Witt & Mahoney, 1995; Kowalski, Crocker & Faulkner, 1997; Sallis & Saelens, 2000). Furthermore, these self –report methods can be also used when in addition to type, intensity and context of PA, other information such as sedentary behaviors (e.g. TV viewing) are needed.

The 3day Physical Activity Record-Greek Version (3dPAR-G, Pavlidou, Michalopoulou, Aggeloussis & Taxildaris, 2009) is a self report time-use questionnaire which was originally developed by Pate et al. (2003) as a 3-day PA recall questionnaire that required the recall of the activity performed during each of the three previous days, starting with the most recent day (always Tuesday). The modified version by Pavlidou and colleagues (2009) is a 3-day PA record and each day is segmented into thirty six 30-minute time blocks (from 6:00 to midnignt). Adolescents had to record the main activity in which they participated during each 30-minute time period as well as to rate the relative intensity of the recorded activity as light, moderate, hard or very hard.

The aim of the present study was to examine the psychometric characteristics of the 3dPAR-G (Pavlidou et al., 2009) in a sample of Greek high-school students, as needed for

every newly designed instrument (Baumgartner & Jackson, 1982). In the present study the concurrent validity of 3dPAR-G was assessed against the MTI Actigraph accelerometer which quantifies physical activity (Welk, 2002) and has proven to be a valid and reliable tool for assessing PA in youth (Eston, Rowlands & Ingledew, 1998; Fairweather, Reilly, Grant, Whittaker & Paton, 1999; Trost, Ward, Moorehead, Watson, Riner, & Burke, 1998). Reliability of 3dPAR-G was assessed through two consecutive measurements that were performed two weeks apart (test-retest reliability). Finally, internal consistency was determined through the estimation of Cronbach's alpha.

Methods

Participants

Fifty seven high school students, 27 boys and 30 girls 13 to 15 years old, participated in the present study. Participants were recruited from three public high schools in Central Greece.. Prior to participation all subjects and their parents provided written informed consent to participate. However, students who had a medical condition that prevented them from participating in physical activity were excluded from the study.

The participants' weight and height were measured. Weight was measured to the nearest 0.1 Kg with a calibrated digital scale (Seca, Model 770, Olney, MD) and height was measured to the nearest 1 cm, with a portable stadiometer. Body mass index (BMI) was also calculated as (Kg/m²).Table 1 depicts all the descriptive data of the participants.

Table 1. Physical Characteristics of the Participants in this Study ($M \pm S.D.$).

	Girls ($n = 30$)	**Boys** ($n = 27$)	**Total** ($n = 57$)
Age (years)	14.21 ± 0.74	13.86 ± 0.77	14.02 ± 0.1
Weight (kg)	53.73± 8.70	56.32 ± 13.13	55.1 ± 10.82
BMI (kg/m²),	20.91 ± 3.12	20.61 ± 3.74	20.8 ± 3.43

Instrumentation

Three-day Physical Activity Record-Greek. The 3-Day Physical Activity Record – Greek (3dPAR-G) is a self report time-use record that was developed by Pavlidou et al (2009) based on the 3-day Physical Activity Recall questionnaire (Pate et al., 2003). It was designed as a time-use log for 3 consecutive days, 2 week days and 1 weekend day. The 3dPAR-G includes (1) an instruction sheet with a brief introduction and the basic instructions for the completion of the PA – record, (2) three PA record sheets (one for each day of recording), (3) a sample activity time sheet, (4) an activity scale with a series of graphics to guide the child in selecting an appropriate intensity rating (low, moderate, hard and very hard), and (5) the list of activities provided. The modifications that were introduced by Pavlidou et al. (2009) include (a) the translation into the Greek language, (b) the modification of the list of activities to be more relevant to Greek adolescents, (c) the range of each day of recording time from 6:00 – 24:00 hours, (d) the use of the Compendium of Energy Expenditure for Youth (Ridley, Ainsworth & Olds 2008) when needed and (e) the participant had to record his/her dominant activity in each one of the 30-minute time blocks (each day was segmented into 36 six 30-minute time blocks). The activities that were omitted from the original list (Pate, 2003) by Pavlidou et al. included: march line, cheerleading, Reserve Officer's Training Corp (ROTC), Lacrosse, tobogganing, paddleball and tubing. Before the actual data collection, eight 13y-old

boys and eight 13 y-old girls were given the questionnaire, the instructions, the activity scale and the list of activities in order to determine difficulties in understanding the procedure and the material. The aforementioned activities appeared to be totally unfamiliar to the students and were removed from the list. Further research regarding the probable modification or replacement of the specific items by more culturally-normative ones seems warranted.

The 3dPAR–G provides a list of 55 common activities grouped into the following categories: sleeping/bathing, eating, working, after-school/spare-time hobbies, transportation and physical activities/sports. For each one of the 30-minute blocks, participants recorded the main activity in which they participated, rated the relative intensity of the designated activity as light, moderate, hard or very hard. A literature–based metabolic equivalent (MET) value based on the Compendium of Energy Expenditure for Youth (Ridley et al., 2008) was assigned to each activity. In case where the reported activity type and the intensity level were not compatible (e.g. watching TV reported as very hard), a MET value was assigned using the Compendium of Energy Expenditure for Youth, that was considered appropriate for the activity and was then verified by the research assistant (Stanley, Boshoff & Dollman 2007). According to the protocol, if a student made more than four incompatible responses per day, it was assumed that he or she did not understand the rating scale and his/her responses were considered invalid (Weston, Petosa & Pat 1997). No participants were excluded from this study due to incompatible responses.

MET values were summed over each of the 3 days of recording for a measure of total daily physical activity ($METs \cdot day^{-1}$). Additionally, for each day the sum of 30-minute blocks of activity classified as moderate to vigorous (3-5.9 METs, MVPA) and as vigorous (> 6 MET, VPA) were summed. Three day averages for $METs \cdot day^{-1}$, MVPA $min \cdot day^{-1}$and VPA $min \cdot day^{-1}$ were then calculated.

MTI/Actigraph. The MTI/Actigraph accelerometer is an objective measure commonly used to validate subjective measures of physical activity such as the 3dPAR-G (Pavlidou et al. 2009). It is designed to detect vertical acceleration of the body joints during movement while rejecting very low and high frequency vibrations (Hendleman, Miller, Bagget, Debold & Freedson, 2000; Welk, Corbin & Dale, 2000). Therefore, it detects only normal human motion (0.25 up to 2.50 Hz, Model 7164, Fort Walton Beach, FL). The accerelometer measures the magnitude of vertical acceleration known as "activity counts" over a user specified period of time-epoch (e.g. $counts \cdot min^{-1}$). A 1-minute sampling interval was used in this study (Pate et al., 2003). Further technical information can be found in previous studies (Ekelund, Yngve, Sjostrom & Westerterp, 2000; Ekelund et al., 2001; Freedson, Pober & Janz, 2005; Nichols, Morgan, Chabot, Sallis & Calfas 2000; Swartz, Strath, Basset, Obrien, King & Ainsworth, 2000). The MTI/CSA Actigraph has been shown to be a valid and reliable tool for assessing the physical activity of children (r=.76, p<.01) as well as of adolescents (r=.93, p<.01, Freedson, Melanson & Sirard, 1998; Trost, et al., 1998; Welk, Blair, Wood, Jones, & Thompson, 2000; Ekelund et al., 2000; Ekelund, 2001). The regression equation by Freedson et al. (1998) was used in order to categorize the number of counts recorded each minute by the level of intensity (light, moderate and vigorous).

Procedures

Data were collected during fall semester (October and November). For practical reasons, participants were divided into three groups (20 students each group). The protocol remained exactly the same for all three groups. On the first day (Friday morning), a trained research assistant outfitted the participants with numbered MTI/Actigraph monitors (Welk, 2005), which they wore for the next five days (Janz et al., 1995; Trost, Ward, McGraw & Pate, 1999). Each morning of the weekend two research assistants contacted all participants

by phone in order to remind them to use the accelerometer and start using the 3dPAR-G. During school days participants were contacted at school in order to verify the use of the accelerometer. Monitors were worn over the right hip, anterior to the iliac crest (Trost, McIver & Pate, 2005). Participants were instructed to wear their monitors all the time except of the periods of bathing, swimming and sleeping. They were also given the 3dPAR-G and they were instructed on how to complete the time use record, starting on Sunday morning. Written instructions for the completion of the 3dPAR-G and the use of the MTI/Actigraph monitor were also given to the participants. At the completion of the 5th day of monitoring period (Wednesday morning) participants returned the monitors and the completed 3dPAR-Gs.

Statistical Analysis

The participants' characteristics, age height, weight and BMI were summarized using descriptive statistics. To determine concurrent validity, the Pearson product-moment correlation coefficients were calculated to evaluate the relations between MTI/Actigraph variables and the 3dPAR-G variables. The MVPA min·day^{-1} and VPA min·day^{-1} from the 3dPAR-G and the average counts per day, for three and five days of MTI/Actigraph monitoring were determined to be highly skewed and were log transformed for further analysis. Regarding test-retest reliability, intra-class correlation coefficients (ICC) were calculated for the repeated administrations of the 3dPAR-G. Additional measures of reliability such as *standard error of measurement (SEM)* (Hopkins, 2000) and limits of agreement (LOA), were also computed. Internal consistency was assessed through Cronbach's alpha. Statistical significance was set at an alpha level of .05.

Results

Means and standard deviations for all seven physical activity variables are depicted in Table 2.

Table 2. Means and Standard Deviations for 3dPAR-G (first administration) and MTI/Actigraph physical activity variables for all 57 participants

	3dPAR-G (*METs·day^{-1}*)		**MTI/Actigraph** (*Counts·day^{-1}*)
	1st week	2nd week	
Monday score	1474 ± 544	1253±1310	403.656 ± 219.468
Tuesday score	1603 ± 670	1541±1165	410.083 ± 208538
Sunday score	1362 ± 812	1383±1299	367.055 ± 245458
3 day average	1482 ± 661	1154±794	393.598±277.001
5 day average	--------	--------	342.743± 243.012
MVPA average (min·day^{-1})	107.2±114.4	97.9± 115.5	78.1± 32.7
VPA average (min·day^{-1})	76.5 ±53.9	117 ± 139	21.5±1.3

Reliability of 3dPAR-G

In order to determine internal consistency for the 3dPAR-G, Crombach's alpha was estimated, for the data collected (METs·day^{-1}) during three consecutive days of the first measurement (Sunday, Monday, Tuesday) of the self-report questionnaire. For a measure to be considered acceptable researchers tend to use an alpha of .70 as a cut-off, with a higher

number indicated higher reliability (Nunnally, 1970), Therefore, internal consistency of 3dPAR-G was rather high (*a*=.81). Table 2 presents the data from the two repeated administrations of the self-report questionnaire for the MET score (METs·day^{-1}) and for the 30-minute blocks of MVPA and VPA (blocks·day^{-1}) for all three days and the 3-day average.

Intraclass correlation coefficient for the 3-day average physical activity score (MET, min·day^{-1}) between the first and the second administration of the 3dPAR-G, was .57 (*Single Measure ICC for 95% CI*: .37-.72). Furthermore, *ICC* for Monday scores was .52 (*Single Measure ICC for 95% CI*: .25-.65), for Tuesday scores *ICC* was .54 (*Single Measure ICC for 95% CI*: .32-.71), and for Sunday scores it was .46 (*Single Measure ICC for 95% CI*: .24-.64). Additionally, *SEM* for the average 3-day physical activity score was 39.95 and *LOA* was -55.09 $\pm$ 562.425, for Monday physical activity score *SEM* was 984.292 and *LOA* was -204.21$\pm$ 257.147, for Tuesday *SEM* was 575,650 and *LOA* was 235.263$\pm$ 1360.347 and for Sunday physical activity score *SEM* was 336,58, and *LOA* was 245.263 $\pm$ 160.122.

Validity of the 3dPAR-G

The Pearson product-moment correlation coefficients between the 3dPAR-G and the Actigraph variables were calculated and are depicted in Table 3. The 3-day physical activity average score was significantly correlated with the 3-day average CSA counts·day^{-1} score as well as with the 5-day average CSA counts·day^{-1} score. Moreover, significant correlations were reported for Monday scores and for Sunday scores.

Table 3. Pearson correlation coefficients between 3dPAR-G variables (METs·day^{-1}) and MTI/ Actigraph variables (counts·day^{-1}), for *n*=57

	3dPAR-G Variables (METs·day^{-1})			
MTI/ Actigraph Variables (counts·day^{-1})	*3day average*	*Sunday*	*Monday*	*Tuesday*
3-day average	.482*	.360*	.481**	.382*
5-day average	.413*	.241	.302*	.327*
Sunday	.147	.348*	.096	.083
Monday	.177	.142	.572**	.219
Tuesday	.181	.158	.184	.404**

*p<.05 **p <.01

Finally, the Pearson correlations coefficients between self reported MVPA and Actigraph minutes are presented in Table 4. Correlations were significant only for 3-day average scores. Regarding self-reported VPA and VPA of MTI/Actigraph minutes, significant correlations were present for the 3-day average scores as well as for the 5-day average scores.

Table 4. Pearson correlation coefficients between MVPA and VPA variables (METs·day^{-1}) of the 3dPAR-G and MTI/Actigraph variables (counts·day^{-1}), for *n*=57

	3dPAR-G Variables (min·day^{-1})	
MTI/ Actigraph Variables (min·day^{-1})	MVPA 3-day average	VPA 3-day average
MVPA 3 day average	.310*	.136
MVPA 5 day average	.224	.091
VPA 3 day average	.177	.410*
VPA 5 day average	.181	.343*

* p <.05

Discussion

The main purpose of the present study was to evaluate reliability and validity of the Greek version of a self-report questionnaire which measures habitual physical activity (PA) in 13- to 15- years-old adolescents. The results indicated that the 3dPAR-G (Pavlidou et al., 2009) is a reliable and highly consistent instrument which assesses reported PA on group level evaluations since the error on individual estimates was rather large. In addition to that, when compared to objectively measured PA, MVPA and VPA were overestimated.

Compared with other relative studies investigating test-retest reliability, (e.g. Argiropoulou et al., 2004; Graig, Bandini, Lichtenstein, Schaefer & Dietz, 1996; Sallis 1991), the reliability coefficient of the 3-day average physical activity score, in the present study, was similar but moderate. Sallis and colleagues (1993) re-tested the a 7-day recall questionnaire within 2 to 3 days and within 2 weeks after the first testing, receiving coefficients of .60 and .51 respectively. Additionally, rather low but significant reliability readings have been reported for self-report questionnaires such as the one in the study of Andersen and Haraldsdottir (1993, *ICC*=.20). On the other hand, very high test-retest reliability has been reported when Weston, Petosa and Pate (1997), re-checked, within one hour, the "Previous Day Physical Activity Recall", which requires the recall of the dominant activity during a series of 30-minute time increments on the previous day (*ICC* =.98, $p<.01$).

In the present study, although test–retest reliability of 3dPAR-G was significant regarding all three days, it turned out to be higher for Monday and Tuesday (school days) than for Sunday. This may be due to the fact that schooldays tend to be more structured for adolescents, concerning their program at school and their extra curricular organized activities. These activities are either recreational (e.g. dance, music and/or swimming lessons) or aim to support their academic performance (e.g. private tutoring regarding science, calculus and/or literature). Duration of these activities is usually fixed and varies from 45 to 90 minutes. This specific structure facilitates the participant in maintaining a fixed schedule throughout consecutive weeks, a fact that may have resulted in higher reliability values for school days compared to Sunday.

The moderate but significant reliability values that were reported in this study both for the 3-day average and for daily scores may be due to the fact that participants were not highly motivated to complete for a second time the 3dPAR-G. The fact that they were not wearing the activity monitor may have limited their desire to participate in this study. According to Kohl et al. (2000), several uncontrollable factors may affect the quality of the data collection procedure in a reliability study. These factors may be the characteristics of the questionnaire, the age, the emotional situation and the changes in the behavior of the respondents (Baumgartner & Jakson, 1982). Furthermore, the fact that the error of measurement on individual estimates was rather large implies that this self-report instrument can be used only for group level assessments among 13-15 year-old Greek adolescents. This fact may also limit the instrument's ability to track participants in an intervention and to associate physiologic outcomes and personal characteristics with different levels of PA. According to Pavlidou et al. (2009) error measures were smaller for 10-12 year old Greek children. The above result revealed different properties for this self-report instrument when used with children, a finding which is not in accordance with previous studies reporting that older children provide more accurate self-report data (Sallis, 1991).

Regarding concurrent validity, the results from the present study provided some evidence that the 3dPAR-G is valid in assessing overall, moderate to vigorous and vigorous physical activity. Similar findings were presented in the study of Argiropoulou et al., (2004) who reported that the 3dPAR 3-day average score and MTI total counts were significantly

correlated (r = .630, p<.001). In the present study when comparing the 3dPAR-G 3-day average score with the MTI total counts for five days, the correlation was also significant. This finding is in accordance with the results of Pate et al. (2003), where both 3- and 7-day monitoring with MTI accelerometer were moderately but significantly correlated to 3dPAR average score (r = .46, p<0.001 and r = .51, p < 0.001). On the other hand, Stanley et al. (2007) reported no significant correlations between the 3dPAR average score and the MTI total counts of 7-day monitoring, suggesting that three days is not enough time to capture usual weekly activity of 12- to 14-year-old adolescents. Finally, Andersen, Hagstromer and Yngve (2005), assessed moderate to vigorous physical activity of adolescents using PDPAR for four consecutive days and reported moderate validity (r = .44, p< 0.001) after comparing the questionnaire to 4-day monitoring with MTI accelerometer. The existing range in validity readings is possibly due to differences in the design and philosophy of self report questionnaires and in the duration of the monitoring procedure (Argiropoulou et al.) since previous studies have demonstrated that although four days of recording are adequate for validation studies in children, the longer the duration the better it is (Janz, 1994; Janz, Witt, & Mahoney, 1995; Trost et al. 2000).

Most relative studies have reported a tendency of self-report questionnaires to overestimate physical activity when compared with objective measures (Sallis & Saelens, 2000). This was true in the present study as well, since the data concerning MVPA min·day^{-1} and VPA min·day^{-1} where lower when recorded with the accelerometer. This overestimation along with the use of adult-derived standard energy costs for specific activities (Ridley et al., 2008) limit the use of this instrument in determining physical activity energy expenditure in youth. Furthermore, the ability of this instrument to assess the satisfaction of PA recommendations that refer to MVPA and VPA, may also be affected by the aforementioned tendency. Additionally, as mentioned before, the participants tended to be more accurate in recording their activities during school days (e.g. Monday & Tuesday) than during weekend (e.g. Sunday). Higher validity values for Monday have been reported also by Stanley and colleagues (2007) suggesting that by being a school day, Monday is more structured and activities are easier to remember. Furthermore, when using a 3-day recall questionnaire administered on Wednesday, Argiropoulou et al. (2004) as well as Pate et al, (2003), found that higher correlations referred to Tuesday's as well as Sunday's activities, suggesting that Tuesday's activities may be easier to recall and Sunday's ones may be more distinct and thus easier to remember as well. The 3dPAR-G though, does not include recalling the activities but instead respondents have to record them through out a 3-day period starting on Sunday, a day that is typically unstructured with low and more variable activity levels (Stanley et al.), probably making the process of recording easier to disrupt, thus resulting in lower validity values. This change that was introduced by Pavlidou et al. (2009) has its origins in a study of Argiropoulou et al., which performed with Greek adolescents. According to the findings, the highest validity and reliability readings (r = .63, ICC= .97) were reported for a 3-day physical activity record, that uses 15-minute intervals, introduced by Bouchard et al. (1983) when compared to a 3-day recall instrument by Cale (1994) and to a 7-day physical activity recall questionnaire by Angerinos, Argiropoulou, Almond & Michalopoulou (2000). Although recalling physical activity facilitates data collection procedure with 3dPAR since it lasts for only 20 minutes (Pate et al.) the prospect of higher validity and reliability readings that have been reported for instruments using recoding of physical activity was set as a priority by Pavlidou and colleagues.

In conclusion, the 3dPAR-G (Pavlidou et al., 2009) has demonstrated moderate correlations with the MTI/ Actigraph accelerometer. However, the present correlations were similar or higher than those of other self report measures presented in the literature for youths (Argiropoulou et al., 2004; Pate et al., 2003; Stanley et al., 2007). Moreover, 3dPAR-G is a

reliable self-report questionnaire when used as a 3-day physical activity diary among Greek speaking male and female adolescents in large scale studies where the use of accelerometry and pedometry are not possible due to the elevated cost and/or the participants' refusal to wear it for several days. However, further research is needed in order to determine in detail validity and reliability issues of the specific self report instrument and establishing its usefulness in youth. In addition to that, future research efforts should also include the use of 3dPAR-G in assessing other PA elements such as context and type of PA as well as duration of sedentary behavior (e.g. media time and TV viewing).

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