ADOLESCENT PHYSICAL ACTIVITY LEVELS AND FAMILY STRUCTURE: COMPARISON OF SELF-REPORTED AND OBJECTIVE DATA

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BACKGROUND

Exercising is a major aspect of a healthy lifestyle, yet adolescents worldwide fail to be sufficiently active (Guthold et al., 2020). Physical activity is multi-dimensional and complex, and is affected by biological, psychological, sociocultural, and environmental factors (Sterdt et al., 2014). Focusing on the impact of family structure, it is known that children growing up in diverse households, defined as non-two-parent biological/adopted households, are more likely to face time constraints, lack financial resources, parental involvement and general support towards activities that aim at promoting a healthier lifestyle (Mazzuco and Meggiolaro, 2014; Quarmby et al., 2011).

Several studies have examined this association; however, their findings are limited to self-reported moderate to vigorous physical activity (MVPA) weekly frequencies. This study will be looking at accelerometer and time-diary derived measures of physical activity based on three different family structures.

METHODS

Data

The study uses the *Millennium Cohort Study (MCS)*. *MCS* is a UK-representative, longitudinal study, where in age 14, time-diary (TUD) and accelerometer (ACC) data were collected on the same days, allowing for direct comparison. *MCS* sample used ensured that all four UK countries are represented, as well as ethnic minority groups and individuals living in deprived areas (Plewis, 2007). School days were identified using the TUD fields: *Homework, In class, School break, School club and Detention.*

Independent variables

Family structure was recoded in two-parent biological/adoptive family, biological/adoptive parent and step-parent, and single parent ('other' types of families <1% of the sample, thus dropped). Parental education was used as a proxy for socio-economic status and the parent with the highest qualification was included (overseas qualifications <1% of the sample, thus dropped). Sex (female/male); Ethnicity (White/non-White); Health (good/bad); Country (England/Scotland/Wales/Northern Ireland); Season (autumn/winter/spring/summer) and TUD Mode for TUD models (app; web; paper – see Chatzitheochari and Mylona, 2021 for a discussion on the *MCS* TUD modal differences).

Time diaries (TUD)

- Time diaries were collected over a 24-hour period for a week day and a weekend day, over a 10 day period, using an app, web or paper
- The app employed a question-based approach, where as the web and paper diaries a grid measurement approach recorded in 10 minute slots
- 44 age-appropriate activity categories were used to describe their daily time-use, including:
  - Individual ball games
  - Jogging, walking, running, hiking
  - Swimming and other water sports
  - Travel by physically active means

Accelerometers (ACC)

- Accelerometer data were collected on the same days as the time diaries
- The MCS used the GENEActiv Original which is triaxial, allowing movement to be recorded in three dimensions, offering higher data accuracy and quality
- Robust and waterproof
- Objective tools used to measure movement in real time, which are reliable and accurate and generate data on duration and intensity of activities
- Main derived variable used:
  - Mins in mod/vig: 5sec epoch, 80% bout criteria 100 ENMO 1min

Figure 1. *MCS time-diary (TUD) and accelerometer (ACC) characteristics*

Table 1. *Descriptive statistics by school/non-school day, family structure and data collection tool (mean and standard error for tobit models; percentages for logistic models)*

		School day (n=1418; 39.4%)			Non-school day (n=2179; 60.6%)		
		Two-parent family (n=1089)	Parent and step-parent (n=101)	Single parent (n=228)	Two-parent family (n=1619)	Parent and step-parent (n=159)	Single parent (n=401)
		$\bar{x}$ (S.E.) / %	$\bar{x}$ (S.E.) / %	$\bar{x}$ (S.E.) / %	$\bar{x}$ (S.E.) / %	$\bar{x}$ (S.E.) / %	$\bar{x}$ (S.E.) / %
MVPA daily duration in mins	ACC[1]	74.4 (43.7)	79.7 (42.2)	75.2 (44.9)	55.7 (50.5)	48.8 (52.3)	48.6 (47.9)
	TUD[2]	69.1 (74.1)	66.0 (66.8)	63.5 (71.2)	76.0 (102.2)	65.5 (101.4)	72.9 (105.9)
≥ 60 mins of MVPA per day	ACC[1]	55.3%	60.4%	57.5%	35.6%	27.0%	29.4%
	TUD[2]	48.3%	44.6%	40.8%	45.8%	37.1%	42.1%

Notes:

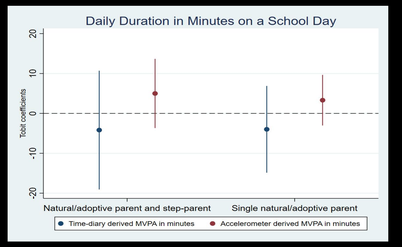
[1] Mins in mod/vig: 5sec epoch, 80% bout criteria 100 ENMO 1min

[2] Cycling; Individual ball games and training; Jogging, running, walking, hiking; Team ball games and training; Swimming and other water sports; Other physical exercise and other sports; Travel by physically active means.

'Bad' quality diaries were dropped (19.2%) (see Chatzitheochari and Mylona, 2021 for criteria) and only one diary was kept of those completed the diaries on two school or non-school days (14.4% dropped). 7.8% of diaries were dropped due to missing data or very low numbers (education: overseas qualification; family structure: other) on the independent variables.

RESULTS

Tobit (duration in mins) and logistic (≥ than 60 mins per day) regression models are used to estimate MVPA levels per data collection instrument on a school and a non-school day.



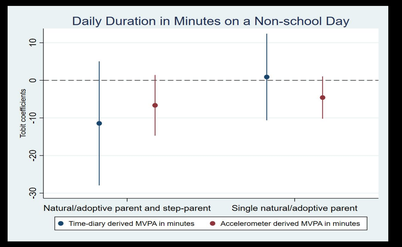
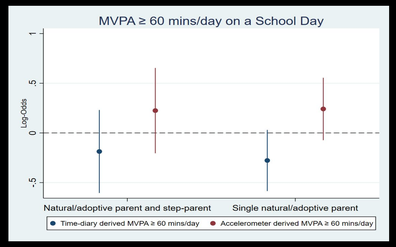


Figure 2. *Tobit model results; Tobit coefficients*



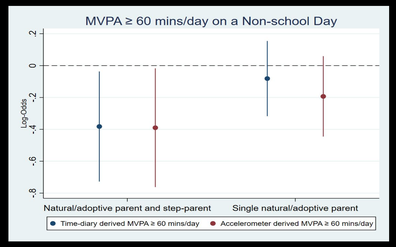


Figure 3. *Logistic regression model results; Log-odds*

Notes:

Adjusted for complex survey design and non-response. Models controlled for: Sex, Ethnicity, Parental education, Season, Country and Subjective health status (also Mode in the TUD models).

CONCLUSIONS

- There seems to be no significant evidence that children living in 'diverse' family structures are disadvantaged when it comes to physical activity levels. Looking at the accelerometer derived coefficients, on school days, children living in 'diverse' family structures have higher odds of meeting the ≥60 daily minutes recommendation and engage for a longer period of time in physical activity. On non-school days, however, children living in 'diverse' family structures seem to spend their time engaging in sedentary activities, making them less likely to reach the desired ≥60 daily minutes recommendation, in particular those living with a parent and a step-parent (ACC and TUD: $p<0.05$), while they also seem to spend considerably less time on physical activity compared to children in two-parent families.
- On school days, children seem to underreport their MVPA levels on the time-diary instrument, making the time-diary a questionable data collection tool for the overall daily MVPA levels of adolescents.

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