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Physical activity among adolescents with long-term illnesses or disabilities in 15 European countries

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HEADER: PA among adolescents with LTID in Europe

Physical activity among adolescents with long-term illnesses or disabilities in 15 European countries

Abstract:

Physical activity (PA) is an important health-promoting behaviour that adolescents with long-term illnesses or disabilities (LTID) can benefit from. It is important to monitor differences across countries in adherence with PA recommendations for health (PARH). The aim of this study was to compare PA levels among 15 European countries after disaggregating data by disability. Data from pupils (Mean age = 13.6y, SD=1.64) participating in the 2013/14 Health Behaviour in School-aged Children (HBSC) study were analysed to compare adolescents without LTID, with LTID and with LTID that affects their participation (affected LTID). Logistic regression models adjusted for age and family affluence, stratified by gender and country group with PARH as the outcome variable. With the data pooled, 15% (n=9,372) of adolescents reported to have LTID and 4% (n=2566) with affected LTID. Overall, fewer boys with LTID met PARH than boys without LTID, although it was not statistically significant at the national levels nor for girls.

Keywords: inclusion; mainstream schools; health; chronic conditions, disability

Introduction

A mass of evidence exists confirming the health benefits from regular physical activity (PA) among adolescents (Poitras et al., 2016). PA is defined as, "any bodily movement produced by skeletal muscles that requires energy expenditure" (Caspersen, Powell, & Christenson, 1985, p. 126) and moderate intensity PA (usually above 3METs) is considered as health-enhancing PA (Biddle, Sallis, & Cavill, 1998). International PA recommendations for health (PARH) for children and adolescents aged 5-17 years old is set to participation of at least 60 minutes of moderate to vigorous-intensity physical activity daily (WHO, 2010). It is also important for youth with disabilities to engage in PA, and meet the PARH since regular participation in PA distinctly reduces health complications secondary to disability conditions (Rimmer, Schiller, Chen, Schiller, & Chen, 2012).

According to the International Classification of Functioning, Disability and Health (ICF; WHO, 2001), people may experience disability because of the interaction between health conditions and contextual factors, thus influencing the child's ability to participate in various activities including PA. Common barriers to participation in PA reported by people with disabilities include attitudes of others, lack of friends, high costs, low self-determination, fatigue, as well as accessibility (Ross et al., 2016). The degree to which these barriers exist to influence levels of PA in adolescents with different impairments may vary, as with adolescents with other chronic health conditions diagnosed by the doctor (Ng, Rintala, Tynjälä, Villberg, & Kannas, 2014). Yet, it is difficult to draw conclusions about these differences when studies use different protocols, instruments, and questions to measure PA. In addition, only six percent of studies published in Adapted Physical Activity Quarterly between 2004 and 2013 came from multiple samples, rather than subtypes of disabilities (Haegele, Lee, & Porretta, 2015). The high possibility of conditions and impairments co-

existing in adolescents, makes increasing PA among young people with a disability an important public health concern (Ding et al., 2016).

Public health and health promotion experts often use monitoring and surveillance studies to assess progress over time between countries and for global evaluations (Brown, Cueto, & Fee, 2006). Global coverage of PA surveillance has increased from 64% of the European adolescent population in 2012 to 68% in 2016 (Sallis et al., 2016). However, it is unknown what proportion, if any, of these surveys involve people with disabilities. The Active Healthy Kids Global Alliance has recognised this in their most recent report card (Tremblay et al., 2016) which presented population-level data from 38 countries but highlighted the need for evidence concerning PA among children with disabilities. These suggestions are in line with the statements in the 2030 sustainable developmental goals that support reporting disaggregation by disability (Tardi & Njelesani, 2015).

In the most recent PA progress report by Sallis and colleagues (Sallis et al., 2016), adolescents that failed to meet the PARH (WHO, 2010) were considered as “inactive”. In other words, for the purpose of surveillance, only adolescents who achieved at least 60 minutes of moderate to vigorous physical activity on a daily basis were considered as active adolescents. Although this benchmark does not allow for consideration of overall differences in PA levels, it serves the purpose for analysis against the PARH which is of primary interest to policy makers for national and international monitoring (Kalman et al., 2015). Due to the absence of data on adolescents with disabilities in existing reports, it is of great importance to report PA levels after disaggregation for disability. Furthermore, reporting of PA against benchmarks used in global surveys is necessary for making comparisons of young people with and without disabilities. Therefore, the purpose of this study is to use the PARH as a reference point to compare prevalence of physically active adolescents across Europe after disaggregating for disability and adjusting for age and family affluence.

Method

Data were analysed from the 2013/14 WHO Collaborative Cross-national Health Behaviour in School-aged Children (HBSC) study. The 15 countries in the current analysis included the same questions on disabilities. All countries participating in HBSC comply with a standardised international protocol, including back translation of items. The samples were at the class level to form nationally representative estimates of 11-, 13- and 15-year-olds. Each team obtained approval to conduct the study through an ethics review board or equivalent regulatory body. The school administrators, parents and pupils granted consent (explicit or implicit, varied by country) for pupil completion of a self-report survey in the classroom without further assistance. Responses from the participants were anonymous, and participation was voluntary. Response rates varied by country, although was >70% at the international student level, with a proportion of the non-responses from absentees.

The pupils were asked to report their sex, month and year of birth as well as family affluence, measured using the Family Affluence Scale (FAS III). FAS III is a six-item assessment of material assets or activities and regarded as a child friendly indicator of social economic status (see Torsheim et al., 2016). FAS III was divided into three groups, low FAS (as represented by the lowest 20 percentile), medium FAS (the middle 60 percentile), and high FAS (highest 20 percentile). A separate analysis was performed for Armenia, since four (FAS II) of the six FAS III items reported.

LTID status

Two items were used to group adolescents according to their long-term illness or disability (LTID) status. Two yes or no questions were asked: 1) “Do you have a long-term illness, disability, or medical condition (like diabetes, arthritis, allergy, or cerebral palsy) that has been diagnosed by a doctor?” and 2)” Does your long-term illness or disability affect

your attendance and participation at school?" Students were classified into three mutually exclusive categories, i) adolescents without LTID, ii) adolescents for whom the participation is not affected by their LTID – grouped as LTID, and iii) adolescents with participation affected by the LTID – grouped as affected LTID. Guided by the International Classification of Functioning, Disability and Health (ICF) definition of disability, the affected LTID group was classified as a group with greater severity of disability to the group of LTID. Data from Bulgaria and Czech Republic consisted of only the first question. The Finnish team collected data on this item only from 13 and 15 year-olds.

Physical activity measures

A single item assessed the number of days the pupil participated in moderate to vigorous physical activity (MVPA) frequency of at least 60 minutes during the last 7 days and was used to measure adherence to the PARH. Text to define PA was included and the question was as follows

Physical activity is any activity that increases your heart rate and makes you get out of breath some of the time. Physical activity can be done in sports, school activities, playing with friends, or walking to school. Some examples of physical activity are running, brisk walking, rollerblading, biking, dancing, skateboarding, swimming, soccer, basketball, football, & surfing [country specific examples can be given].

Over the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?

Please ***add up*** *all the time you spent in physical activity each day.*

Response categories ranged from 0 day to 7 days. Results from validity studies include correlation coefficient of 0.40 when compared with accelerometer data in clinical settings (Murphy, Rowe, Belton, & Woods, 2015; Prochaska, Sallis, & Long, 2001) and the

item has been in use in the HBSC study since 2001/2002 survey. The ICC value from a test-retest was 0.82 (Liu et al., 2010). In accordance with the PARH (WHO, 2010), and the definitions by the PA progress report (Sallis et al., 2016), responses were dichotomised into 0-6 days as "inactive", in other words, not meeting the PARH, and 7 days as "active", as meeting the PARH.

Statistics

Descriptive statistics were conducted on the data stratified by gender and country. Missing cases from the LTID status were grouped and tested independently against PARH. Since differences were $p<0.05$, the cases were removed. Differences in prevalence of LTID between boys and girls were tested using a chi-square test of independence (Table 1). Binary logistic regression analyses were performed separately by country, with PARH as the outcome variable and LTID status as the main independent variable. Reporting of odds ratios (OR), with the 95% confidence intervals, first by the overall sample, then for each country, were performed. The reference group was those without LTID. All analyses were conducted after controlling for age categories and family affluence. Analyses were done with SPSS for Windows (version 24.0)

Results

LTID prevalence

The pooled sample size was 61,329 participants (48.7% boys, mean age=13.6yr SD=1.7) from the 15 countries (see Table 1 for the list of countries). Less than one in six (15.3%, n=9,372) of adolescents reported to have LTID. One in twenty (4.2%, n=2566) reported that their disability affects their participation at school and were therefore classified as affected LTID. The proportions of affected LTID increased from 11-y (3.4%; 95% CI: 3.1%-3.6%), 13-y (4.2%; 95% CI: 3.9%-4.5%), to 15-y olds (4.9%; 95% CI: 4.6%-5.2%).

Gender differences were only significant in some countries, whereby there were more boys than girls with LTID or affected LTID (Armenia, Scotland and Ireland), or the prevalence was greater amongst girls than boys (Bulgaria, Romania). There were no significant differences in the prevalence across the different FAS groups.

PA recommendations for health

After pooling data from all countries, more boys (24.4%; 95% CI: 23.9%-24.9%) met the PARH than girls (15.5%; 95% CI:15.1%-15.9%), more 11y- (25.2%; CI:24.5%-25.8%), and 13y – (19.8%; CI:19.3%-20.3%) met the PARH than 15y –olds (14.8%; CI: 14.3%-15.3%). In addition, more adolescents from the high FAS group met the PARH (24.3%; CI=23.5%-25.1%) than medium FAS (18.7%; CI:18.3%-19.1%) and low FAS (18.0%; CI:17.3%-18.8%). The patterns between age, gender and FAS III were similar across disability groups.

Overall, boys with LTID were less likely to meet the recommendations than boys without LTID, although differences amongst girls were not significant. At country level, the proportions of boys with and without LTID meeting PARH were not significantly different. In one country (Slovakia), a significant association was observed between affected LTID and meeting the PARH amongst both boys and girls with OR 2.1 (CI: 1.1-4.2) and OR=1.9 (CI:=1.0-3.6) respectively. In Romania, the likelihood of meeting PARH increased in girls with LTID with OR=1.8 (CI=1.1-3.1) and with affected LTID with OR=3.6 (CI=1.7-7.9) when compared with girls without LTID (Table 2).

Discussion

Through the same measures reported in the 2016 PA progress report, data in this study were disaggregated by disability across 15 countries to report proportions of adolescents who meet PARH. Consistent with the previous reports, meeting the PARH was

more common among boys, younger adolescents, and those from higher affluence families (Kalman et al., 2015). According to the results from this study, there were no significant differences in meeting PARH between boys or girls with LTID and those without LTID at a national level, with two exceptions (Romania and Slovakia). After the data were pooled together, boys with LTID were less likely to meet the PARH than their peers without LTID, but this effect was not observed for girls.

The results of this study add to the current literature on adolescents that met PARH by providing data disaggregated by disability on adolescents in mainstream schools, and using a comparable measure of PA across countries. Previous studies generally report lower levels of PA in adolescents with disabilities compared to their peers without disabilities (Ross et al., 2016). In this study, this finding was only observed among boys and after pooling the data across countries. This may be attributed to the fact that previous studies have often focused on specific disability subcategories (Haegele et al., 2015) whereas the current study included data from general schools with multiple samples of various (self-reported) impairments and health conditions. Although overall, 20% of adolescents reported disabilities or chronic conditions, less than one in twenty said that their disability affected their daily functioning at school. As such, the majority of adolescents with LTID reported their conditions were independent of their ability to participate in school. In addition, this study indicates that the restrictions felt by adolescents in the affected LTID did not influence meeting PARH when compared with their peers. Since overall proportions that met the PARH were low in all countries, it is clear that there needs to be vast improvements in PA levels in all children, regardless of disability. Practitioners with access to adolescents in mainstream schools may need to consider the increasing rate of inclusion in schools. Furthermore, practitioners are encouraged to promote PA to girls, and take care in addressing the divide in PA levels among boys with and without LTID.

Europe is a culturally diverse area with inclusive practices in Central and Eastern European countries different from Western European countries (UNICEF, 2012). Despite such differences, significant differences at the national level were found in only two countries. In Slovakia (boys and girls) and Romania (girls only), those with LTID or affected LTID were more likely to meet the PARH. Cultural differences in educational policies, access to support services and availability of physical activity opportunities may play a role. For example, both are Central and Eastern European countries and segregated school systems are still commonplace for children with specific needs. This may mean adolescents with disabilities who attend mainstream schools are less likely to have severe disabilities, and those that do, can benefit the most with the existing support services (UNICEF, 2012). These differences may explain the unexpected increased proportion of affected LTID that met the PARH over adolescents without LTID

The findings from this study were dependent on the way adolescents reported LTID and PA as well as responded to the questions unaided. As such, there are some study limitations to consider. PA was measured by self-report and there could be inaccuracies to the response. However, self-report surveys are considered an appropriate way to collect data from large population samples on PA for the purposes of meeting PARH (Haskell, 2012) and all young people participating in this study were asked the same questions in the same way. In relation to reporting on levels of physical activity, the practice used in this study was replicated from Sallis and colleagues (2016) which considered young people as active only if they achieved at least 60 minutes of MPVA daily in line with current international policy recommendations. However, this may inadvertently mask differences between people (e.g. 0 days vs 2 days vs 6 days) that could be illuminating and should be investigated further in future research.

In relation to the question used to identify those with a long-term illness or disability, it should be noted that disability is not synonymous with being ill, although they often co-exist. Disabilities were measured at two levels and not by impairment types. The first level was the type of disability that the individual reports. This could be a manageable health condition, such as asthma or speaking impairments, which might not have a major effect on physical activity participation. The second level is the type of disability whereby the disability or health condition affects daily participation. It remains unknown what context, other than of school participation this was, but in reference to the ICF (WHO, 2001), these pupils would be expected to have more difficulties in daily functioning. In addition, to improve the global PA matrix, disability statistics are needed to confirm a systematic method to compare data (Tremblay et al., 2016). Despite the study limitations, this paper has results that can be used for international comparisons for PARH and contribute to data sets like the global matrix.

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Table 1. Prevalence of LTID (%) in different countries in Europe by boys and girls

	Boys				Girls				χ^2*	p-value
	N	No LTID %	LTID %	Affected LTID %	N	No LTID %	LTID %	Affected LTID %		
Armenia	946	92.0	4.1	3.9	1315	94.8	3.6	1.7	11.45	.003
Bulgaria	2396	90.7	9.3	nd	2225	88.3	11.7	nd	7.80	.006
Czech Republic	2367	73.6	26.4	nd	2619	71.7	28.3	nd	2.33	.127
England	2311	75.6	18.6	5.8	2193	76.3	17.4	6.3	1.64	.441
Finland	1454	70.4	25.3	4.3	1671	68.3	26.0	5.6	3.53	.171
France	2523	79.0	16.1	5.0	2553	79.4	16.3	4.3	1.21	.547
Hungary	1464	76.2	20.4	3.5	1632	74.7	22.3	3.0	2.14	.342
Ireland	1320	76.0	17.8	6.2	2172	80.9	14.0	5.0	12.20	.002
MKD	1417	92.3	5.3	2.4	1656	93.6	4.6	1.8	2.17	.337
Poland	2182	82.8	10.6	6.6	2228	81.0	11.6	7.5	2.62	.271
Romania	1248	93.3	5.5	1.2	1502	90.7	6.9	2.5	8.16	.017
Scotland	2376	80.0	15.0	5.1	2493	83.2	11.4	5.4	13.48	.001
Sweden	3113	75.8	16.8	7.4	3266	74.8	16.4	8.8	4.22	.121
Slovakia	2299	81.7	16.3	2.0	2476	79.6	17.6	2.7	4.42	.110
Wales	1912	80.6	13.2	6.2	1987	82.9	11.0	6.1	4.65	.098
Total	29341	80.5	15.4	4.1	31988	80.5	15.2	4.3	1.53	.465

nd – no data

LTID – Long term illnesses or disabilities

χ^2*Chi-square test of independence of adolescents without LTID between boys and girls

Table 2. Proportion of no LTID, LTID, and affected LTID (%), adolescents who meet PA recommendations for health with adjusted odds ratio and 95% Confidence Intervals

	Boy									Girl								
	No LTID	LTID				Affected LTID				No LTID	LTID				Affected LTID			
	%	%	OR	LCI	UCI	%	OR	LCI	UCI	%	%	OR	LCI	UCI	%	OR	LCI	UCI
Armenia [a]	26.7	17.9	0.55	0.23	1.36	24.3	0.59	0.24	1.45	17.3	8.5	0.45	0.16	1.27	27.3	2.03	0.76	5.39
Bulgaria [b]	32.9	37.8	1.28	0.94	1.74	nd				22.0	21.8	1.01	0.73	1.40	nd			
Czech [b]	25.4	22.9	0.92	0.74	1.14	nd				17.8	19.3	1.16	0.93	1.45	nd			
England	20.8	21.1	0.95	0.71	1.27	22.4	1.01	0.62	1.62	13.0	16.3	1.30	0.94	1.81	12.2	1.08	0.62	1.87
Finland [c]	23.4	26.1	1.15	0.87	1.52	27.4	1.21	0.67	2.20	17.4	17.7	1.03	0.77	1.39	13.8	0.87	0.47	1.61
France	15.9	16.0	0.98	0.72	1.33	22.4	1.49	0.93	2.37	7.1	10.1	1.44	0.98	2.11	12.7	1.83	0.97	3.44
Hungary	27.9	22.1	0.75	0.55	1.02	25.5	0.86	0.44	1.68	16.3	17.3	1.07	0.77	1.47	14.3	0.91	0.40	2.07
Ireland	32.7	32.8	1.03	0.75	1.42	31.7	0.95	0.57	1.57	15.4	17.7	1.13	0.80	1.59	15.6	1.15	0.65	2.03
MKD	32.6	37.3	1.27	0.76	2.11	26.5	0.65	0.29	1.45	21.2	18.4	0.92	0.50	1.68	13.3	0.65	0.22	1.92
Poland	29.4	31.0	1.09	0.80	1.47	28.0	1.00	0.67	1.47	18.6	17.4	0.99	0.70	1.41	16.9	0.97	0.63	1.50
Romania	26.6	17.4	0.60	0.31	1.20	26.7	0.48	0.10	2.27	13.2	21.4	**1.82**	**1.06**	**3.12**	29.7	**3.64**	**1.69**	**7.86**
Scotland	19.3	20.8	1.00	0.74	1.34	22.5	1.10	0.67	1.82	13.5	15.4	1.11	0.77	1.60	14.8	1.27	0.76	2.12
Sweden	15.9	14.9	0.84	0.63	1.12	13.0	0.82	0.54	1.26	10.5	11.4	1.08	0.79	1.46	10.1	0.95	0.62	1.44
Slovakia	30.4	30.2	0.92	0.70	1.21	40.4	**2.09**	**1.06**	**4.15**	19.2	20.1	1.01	0.76	1.34	25.0	**1.91**	**1.01**	**3.59**
Wales	19.0	18.8	0.94	0.67	1.33	15.1	0.78	0.46	1.33	11.5	14.6	1.32	0.87	1.99	9.1	0.76	0.39	1.49
Total	24.6	23.4	**0.89**	**0.81**	**0.98**	22.5	0.91	0.78	1.06	15.4	16.6	1.09	0.98	1.22	14.2	1.06	0.89	1.26

[a] Armenia used FASII
[b] Bulgaria and Czech did not include data on severity ; nd – no data
[c] Finland did not include data from 11-y
bold text p<.05, LCI = Lower Confidence Interval, UCI = Upper Confidence Interval
LTID – long-term illnesses, disabilities or medical conditions
no LTID is reference group, adjusted for age and FAS

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Keywords: inclusion; mainstream schools; health; chronic conditions, disability

Introduction ~~(2397/1500-2000 words)~~

A mass of evidence exists confirming the health benefits from regular physical activity (PA) among adolescents (Poitras et al., 2016). PA is defined as, "any bodily movement produced by skeletal muscles that requires energy expenditure" (Caspersen, Powell, & Christenson, 1985, p. 126) and moderate intensity PA (usually above 3METs) is considered as health-enhancing PA (Biddle, Sallis, & Cavill, 1998). International PA recommendations for health (PARH) for children and adolescents aged 5-17 years old is set to participation of at least 60 minutes of moderate to vigorous-intensity physical activity daily (WHO, 2010). It is also important for youth with disabilities to engage in PA, and meet the PARH since regular participation in PA distinctly reduces health complications secondary to disability conditions (Rimmer, Schiller, Chen, Schiller, & Chen, 2012).

According to the International Classification of Functioning, Disability and Health (ICF; WHO, 2001), people may experience disability because of the interaction between health conditions and contextual factors, thus influencing the child's ability to participate ~~to~~in various activities including PA. Common barriers to participation in PA reported by people with disabilities include attitudes of others, lack of friends, high costs, low self-determination, fatigue, as well as accessibility (Ross et al., 2016). The degree to which these barriers exist to influence levels of PA in adolescents with different impairments may vary, as with adolescents with other chronic health conditions diagnosed by the doctor (Ng, Rintala, Tynjälä, Villberg, & Kannas, 2014). Yet, it is difficult to ~~make~~draw conclusions about these differences when studies use different protocols, instruments, and questions to measure PA. In addition, only six percent of studies published in Adapted Physical Activity Quarterly between 2004 and 2013 came from multiple samples, rather than subtypes of disabilities (Haegele, Lee, & Porretta, 2015). The high possibility of conditions and impairments co-

existing in adolescents, makes increasing PA among young people with a disability an important public health concern (Ding et al., 2016).

Public health and health promotion experts often use monitoring and surveillance studies to assess progress over time between countries and for global evaluations (Brown, Cueto, & Fee, 2006). Global coverage of PA surveillance has increased from 64% of the European adolescent population in 2012 to 68% in 2016 (Sallis et al., 2016). However, it is unknown what proportion, if any, of these surveys involve people with disabilities. The Active Healthy Kids Global Alliance has recognised this in their most recent report card (Tremblay et al., 2016) which presented population-level data from 38 countries but highlighted the need for evidence concerning PA among children with disabilities. These suggestions are in line with the statements in the 2030 sustainable developmental goals that support reporting disaggregation by disability (Tardi & Njelesani, 2015).

In the most recent PA progress report by Sallis and colleagues (Sallis et al., 2016), adolescents that failed to meet the PARH (WHO, 2010) were considered as "inactive". In other words, for the purpose of surveillance, only adolescents who achieved at least 60 minutes of moderate to vigorous physical activity on a daily basis were considered as active adolescents. Although this benchmark does not allow for consideration of overall differences in PA levels, it serves the purpose for analysis against the PARH which is of primary interest to policy makers for national and international monitoring (Kalman et al., 2015). Due to the absence of data on adolescents with disabilities in existing reports, it is of great importance to report PA levels after disaggregation for disability. Furthermore, reporting of PA against benchmarks used in global surveys is necessary for making comparisons of young people with and without disabilities. Therefore, the purpose of this study is to use the PARH as a reference point to compare prevalence of physically active adolescents across Europe after disaggregating for disability and adjusting for age and family affluence.

Method

Data were analysed from the 2013/14 WHO Collaborative Cross-national Health Behaviour in School-aged Children (HBSC) study~~ and currently includes 45 member countries from North America and Europe.~~. The 15 countries in ~~this study~~the current analysis included the same questions on disabilities~~ as an optional package~~. All countries participating in HBSC comply with a standardised international protocol, including back translation of items. The samples were at the class level to form nationally representative estimates of 11-, 13- and 15-year-olds. Each team obtained approval to conduct the study through an ethics review board or equivalent regulatory body. The school administrators, parents and pupils granted consent (explicit or implicit, varied by country) for pupil completion of a self-report survey in the classroom without further assistance. Responses from the participants were anonymous, and participation was voluntary. Response rates varied by country, although was >70% at the international student level, with a proportion of the non-responses from absentees.

The pupils were asked to report their sex, month and year of birth as well as family affluence, measured using the Family Affluence Scale (FAS III). FAS III is a six-item assessment of material assets or activities and regarded as a child friendly indicator of social economic status (see Torsheim et al., 2016). FAS III was divided into three groups, low FAS (as represented by the lowest 20 percentile), medium FAS (the middle 60 percentile), and high FAS (highest 20 percentile). A separate analysis was performed for Armenia, since four (FAS II) of the six FAS III items reported.

LTID status

Two items were used to group adolescents according to their long-term illness or disability (LTID) status. Two yes or no questions were asked: 1) “Do you have a long-term

illness, disability, or medical condition (like diabetes, arthritis, allergy, or cerebral palsy) that has been diagnosed by a doctor?" and 2)" Does your long-term illness or disability affect your attendance and participation at school?" Students were classified into three mutually exclusive categories, i) adolescents without LTID, ii) adolescents for whom the participation is not affected by their LTID – grouped as LTID, and iii) adolescents with participation affected by the LTID – grouped as affected LTID. Guided by the International Classification of Functioning, Disability and Health (ICF) definition of disability (WHO, 2001), the affected LTID group was classified as a group with greater severity of disability to the group of LTID. ~~The grouping was then determined if this classification of everyday participation restrictions is related to their health behaviour (i.e. PA).~~ Data from Bulgaria and Czech Republic consisted of only the first question. The Finnish team collected data on this item only from 13 and 15 year-olds.

Physical activity measures

A single item assessed the number of days the pupil participated in moderate to vigorous physical activity (MVPA) frequency of at least 60 minutes during the last 7 days and was used to measure adherence to the PARH. Text to define PA was included and the question was as follows

Physical activity is any activity that increases your heart rate and makes you get out of breath some of the time. Physical activity can be done in sports, school activities, playing with friends, or walking to school. Some examples of physical activity are running, brisk walking, rollerblading, biking, dancing, skateboarding, swimming, soccer, basketball, football, & surfing [country specific examples can be given].

Over the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?

*Please **add up** all the time you spent in physical activity each day.*

Response categories ranged from 0 day to 7 days. Results from validity studies include correlation coefficient of 0.40 when compared with accelerometer data in clinical settings (Murphy, Rowe, Belton, & Woods, 2015; Prochaska, Sallis, & Long, 2001) and the item has been in use in the HBSC study since 2001/2002 survey. The ICC value from a test-retest was 0.82 (Liu et al., 2010). In accordance with the PARH (WHO, 2010), and the definitions by the PA progress report (Sallis et al., 2016), responses were dichotomised into 0-6 days as "inactive~~"~~", in other words, not meeting the PARH, and 7 days as "active~~".~~", as meeting the PARH.

Statistics

Descriptive statistics were conducted on the data stratified by gender and country. Missing cases from the LTID status were grouped and tested independently against PARH. Since differences were $p<0.05$, the cases were removed. Differences in prevalence of LTID between boys and girls were tested using a chi-square test of independence (Table 1). Binary logistic regression analyses were performed separately by country, with PARH as the outcome variable and LTID status as the main independent variable. Reporting of odds ratios (OR), with the 95% confidence intervals, first by the overall sample, then for each country, were performed. The reference group was those without LTID. All analyses were conducted after controlling for age categories and family affluence. Analyses were done with SPSS for Windows (version 24.0)

Results

LTID prevalence

The pooled sample size was 61,329 participants (48.7% boys, mean age=13.6yr SD=1.7) from the 15 countries (see Table 1 for the list of countries). ~~One~~Less than one in ~~five~~

~~(19.5~~six (15.3%, n=~~11,938~~9,372) of adolescents reported to have LTID. ~~A quarter of this group (~~One in twenty (4.2%, n=2566) reported that their disability affects their participation at school and were therefore classified as affected LTID. The proportions of affected LTID increased from 11-y (3.4%; 95% CI: 3.1%-3.6%), 13-y (4.2%; 95% CI: 3.9%-4.5%), to 15-y olds (4.9%; 95% CI: 4.6%-5.2%). Gender differences were only significant in some countries, whereby there were more boys than girls with LTID or affected LTID (Armenia, Scotland and Ireland), or the prevalence was greater amongst girls than boys (Bulgaria, Romania). There were no significant differences in the prevalence across the different FAS groups.

PA recommendations for health

After pooling data from all countries, more boys (24.4%; 95% CI: 23.9%-24.9%) met the PARH than girls (15.5%; 95% CI:15.1%-15.9%), more 11y- (25.2%; CI:24.5%-25.8%), and 13y – (19.8%; CI:19.3%-20.3%) met the PARH than 15y –olds (14.8%; CI: 14.3%-15.3%). In addition, more adolescents from the high FAS group met the PARH (24.3%; CI=23.5%-25.1%) than medium FAS (18.7%; CI:18.3%-19.1%) and low FAS (18.0%; CI:17.3%-18.8%). The patterns between age, gender and FAS were similar across disability groups.

Overall, boys with LTID were less likely to meet the recommendations than boys without LTID, although differences amongst girls were not significant. ~~The~~At country level, the proportions of boys with and without LTID ~~in each country~~meeting PARH were not significantly different. In one country (Slovakia), a significant association was observed between affected LTID and meeting the PARH amongst both boys and girls with OR 2.1 (CI: 1.1-4.2) and OR=1.9 (CI:=1.0-3.6) respectively. In Romania, the ~~association with~~likelihood of meeting PARH increased in girls with LTID with OR=1.8 (CI=1.1-3.1) and with affected LTID with OR=3.6 (CI=1.7-7.9) when compared with girls without LTID (Table 2).

Discussion

Through the same measures reported in the 2016 PA progress report, data in this study were disaggregated by disability across 15 countries to report proportions of adolescents who meet PARH. Consistent with the previous reports, meeting the PARH was more common among boys, younger adolescents, and those from higher affluence families (Kalman et al., 2015). According to the results from this study, there were no significant differences in meeting PARH between boys or girls with LTID and those without LTID at a national level, with two exceptions~~-~~ (Romania and Slovakia). After the data were pooled together, boys with LTID were less likely to meet the PARH than their peers without LTID, but this effect was not observed for girls.

The results of this study add to the current literature on adolescents that met PARH by providing data disaggregated by disability on adolescents in mainstream schools, and using a comparable measure of PA across countries. Previous studies generally report lower levels of PA in adolescents with disabilities compared to their peers without disabilities (Ross et al., 2016). In this study, this finding was only observed among boys and after pooling the data across countries. This may be attributed ~~from~~to the fact that previous studies have often ~~included~~ focused on specific disability subcategories (Haegele et al., 2015) whereas the current study included data from general schools with multiple samples of various (self-reported) impairments and health conditions. Although overall, 20% of adolescents reported disabilities or chronic conditions~~. In all countries~~, less than one in ~~ten~~twenty said that their disability affected their daily functioning at school. As such, the majority of adolescents with LTID reported their conditions were independent ~~on~~of their ability to participate in school. In addition, this study indicates that the restrictions felt by adolescents in the affected LTID did not influence meeting PARH when compared with their peers. Since overall proportions that met the PARH were low in all countries, it is clear that there needs to be vast improvements

in PA levels in all children, regardless of disability. Practitioners with access to adolescents in mainstream schools may need to consider the increasing rate of inclusion in schools. Furthermore, practitioners are encouraged to promote PA to girls, and take care in addressing the divide in PA levels among boys with and without LTID.

~~Significant~~Europe is a culturally diverse area with inclusive practices in Central and Eastern European countries different from Western European countries (UNICEF, 2012). Despite such differences, significant differences at the national level were found in only two countries. In Slovakia (boys and girls) and Romania (girls only), ~~where~~ those with LTID or affected LTID were more likely to meet the PARH. ~~The only country level results that were significant were from Romania and Slovakia, where a larger proportion of adolescents with affected LTID met the PARH than adolescents without LTID. In these countries, the results contrast with previously published differences between adolescents with~~ Cultural differences in educational policies, access to support services and ~~without participation difficulties (Ross et al., 2016). In~~availability of physical activity opportunities may play a role. For example, both are Central and Eastern European countries~~,~~ and segregated school systems are still commonplace for children with specific needs. ~~which~~This may mean adolescents with disabilities ~~that do~~who attend mainstream schools are less likely to have severe disabilities, and ~~have been reported to~~those that do, can benefit the most with the existing support services (UNICEF, 2012). These differences may explain the unexpected increased proportion of affected LTID that met the PARH over adolescents without LTID

The findings from this study were dependent on the way adolescents reported LTID and PA as well as responded to the questions unaided~~, reported LTID and PA~~. As such, there are some study limitations to consider. PA was measured by self-report and there could be inaccuracies to the response. However, self-report surveys are considered an appropriate way to collect data from large population samples on PA for the purposes of meeting PARH

(Haskell, 2012) and all young people participating in this study were asked the same questions in the same way. In relation to reporting on levels of physical activity, the practice used in this study was replicated from Sallis and colleagues (2016) which considered young people as active only if they achieved at least 60 minutes of MPVA daily and is in line with current international policy recommendations. However, this may inadvertently mask differences between people (e.g. 0 days vs 2 days vs 6 days) that could be illuminating and should be investigated further in future research.

In relation to the question used to identify those with a long-term illness or disability, it should be noted that disability is not synonymous with being ill, although they often co-exist. Disabilities were measured at two levels and not by impairment types. The first level was the type of disability that the individual reports. This could be a manageable health condition, such as asthma or speaking impairments, which might not have a major effect on physical activity participation. The second level is the type of disability whereby the disability or health condition affects daily participation. It remains unknown what context, other than of school participation this was, but in reference to the ICF (WHO, 2001), these pupils would be expected to have more difficulties in daily functioning. In addition, to improve the global PA matrix, disability statistics are needed to confirm a systematic method to compare data (Tremblay et al., 2016). Despite the study limitations, this paper has results that can be used for international comparisons for PARH and contribute to data sets like the global matrix.

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