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ORIGINAL RESEARCH

Prevalence and Correlates of Adherence to the Global Total Physical Activity Guideline Based on Step Counting Among 3- to 4-Year-Olds: Evidence From SUNRISE Pilot Studies From 17 Countries

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Background: There is limited evidence from globally diverse samples on the prevalence and correlates of meeting the global guideline of 180 minutes per day of total physical activity (TPA) among 3- to 4-year-olds. ***Methods:*** Cross-sectional study involving 797 (49.2% girls) 3- to 4-year-olds from 17 middle- and high-income countries who participated in the pilot phases 1 and 2 of the SUNRISE International Study of Movement Behaviours in the Early Years. Daily step count was measured using thigh-worn *activ*PAL accelerometers. Children wore the accelerometers for at least one 24-hour period. Children were categorized as meeting the TPA guideline based on achieving ≥11,500 steps per day. Descriptive analyses were conducted to describe the proportion of meeting the TPA guideline for the overall sample and each of the sociodemographic variables, and 95% CIs were calculated. Multivariable logistic regression was used to determine the sociodemographic correlates of meeting the TPA guideline. ***Results:*** Mean daily step count was 10,295 steps per day (SD = 4084). Approximately one-third of the sample (30.9%, 95% CI, 27.6–34.2) met the TPA guideline. The proportion meeting the guideline was significantly lower among girls (adjusted OR [aOR] = 0.70, 95% CI, 0.51–0.96) and 4-year-olds (aOR = 0.50, 95% CI, 0.34–0.75) and higher among rural residents (aOR = 1.78, 95% CI, 1.27–2.49) and those from lower middle-income countries (aOR = 1.35, 95% CI, 0.89–2.04). ***Conclusions:*** The findings suggest that a minority of children might meet the TPA guideline globally, and the risk of not meeting the guideline differed by sociodemographic indicators. These findings suggest the need for more surveillance of TPA in young children globally and, possibly, interventions to improve childhood health and development.

Keywords: child, preschool, accelerometry, physical activity surveillance, behavioral epidemiology

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The World Health Organization (WHO) guidelines on physical activity for children under the age of 5 years recommend that children aged 3–4 years should accumulate a minimum of 180 minutes per day of total physical activity (TPA), including a minimum of 60 minutes per day of moderate- to vigorous-intensity physical activity, for healthy growth and development.[1] Physical activity has several benefits in childhood and across the lifespan.[2] For example, physical activity is associated with improved motor development, adiposity, cardiometabolic and psychosocial health, and bone and skeletal health.[3,4] Thus, promoting physical activity is critical for optimal health and well-being of young children and is one of the key components for tackling the obesity pandemic worldwide.[1] Despite the publication of these guidelines in 2019, there is limited evidence from globally diverse samples on adherence to the WHO TPA guideline among 3- and 4-year-old children. Moreover, evidence on adherence to the WHO TPA guideline is predominantly from studies conducted in high-income countries (HICs).[5] Based on the behavioral epidemiology framework,[6] which lays out 5

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systematic phases of research studies on health-related behaviors to enhance the population's health, large, cross-country, and intercontinental descriptive studies are required to understand geographical and cultural variations in adherence to the WHO TPA guideline. Such studies will ultimately inform the need for surveillance and evidence-based interventions and practices to improve children's health. One possible reason for the lack of global evidence, including in low- and middle-income countries, could be the high costs for surveillance and lack of cross-cultural validity and appropriateness of the measurement methods.[5]

Common methods to measure guideline adherence in large-scale studies include proxy reports from parents and device-based measures (eg, accelerometry and pedometers). Recent evidence suggests that parents may not accurately report the time their 3- to 4-year-old child spends in physical activity.[7] Mwase-Vuma et al[7] found that parents tended to substantially overestimate the time their child spent in physical activity compared with device-based measurements. Consequently, step counting (using devices like pedometers, which are less expensive than accelerometers) has been suggested as a low-cost alternative for global surveillance of physical activity in early childhood[7] to enhance public health surveillance globally.[8]

Previous studies have proposed varying step count thresholds derived from ActiGraph accelerometer output as equivalent to 180 minutes per day of TPA in preschool-aged children.[9–11] Step-based goals have practical utility as they are relatively accurate, intuitive, motivating, and easily measured and understood by the public.[12] Our recent study[7] used steps derived from *activ*PAL to cross-validate 3 existing step count thresholds.[9–11] We found that the step counting threshold of 11,500 steps per day proposed by De Craemer et al[11] provided excellent classification for meeting the WHO TPA guideline as measured by accelerometry[7] and is, therefore, appropriate for the global surveillance of the WHO TPA guideline in early childhood.

Few published studies have assessed adherence to the TPA guideline using the 11,500 steps per day threshold in preschoolers aged 3–4 years.[13–16] These studies focused on HICs in Europe and Asia, which may limit their generalizability in other contexts.[13–16] We used the De Craemer et al[11] threshold of 11,500 steps per day as measured by *activ*PAL to understand how step counting can effectively inform the WHO TPA guideline for 3- to 4-year-olds globally.

Methods

Study Design and Participants

This was a cross-sectional study using *activ*PAL (PAL Technologies Ltd) data collected during phases 1 and 2 (collectively considered the pilot phase) of the SUNRISE International Study of Movement Behaviours in the Early Years. Methods of recruitment and data collection have been described previously.[7,17] In short, data collection for the first 2 pilot study phases was conducted between March 2018 and September 2020 and involved over 2500 children aged 2–6 years from 23 countries. Participating countries were initially recruited by members of the SUNRISE Leadership Group through their existing collaborations and, subsequently, through invitation or expression of interest.[17] Of the 23 participating countries, only 17 countries used an *activ*PAL accelerometer, and data collection in these countries was completed by November 2019, before the COVID–19 pandemic. These 17 countries were included in the current study.

Participants were recruited using convenience cluster sampling from an early childhood education and care center, school, community center, or at village level (hereafter "study site").[17] A consent was required from the early childhood education and care center or school director prior to seeking consent from parents. The process might be slightly different for countries wherein recruitment was done through the community or at village level. The parents of eligible children were then contacted to provide written informed consent for their child's participation. Children were eligible to participate in the pilot phase of the SUNRISE Study if they were aged 3 and 4 years, their parents consented for their participation, and they were able to wear an accelerometer. However, other participating countries recruited older children due to the vastly differing context and preschool age. Consequently, the main inclusion criteria for the current study were having *activ*PAL data and participant age.

Data for *activ*PAL were available for 955 children from 17 diverse countries who participated in the pilot phase of the SUNRISE Study. Of these, 158 were excluded because they were aged below 3 years or 5 years and older. Hence, the analytical sample comprised 797 preschoolers aged 3.0 to <5.0 years. We will not present data for the excluded children who did meet the age criteria for the present study. The Human Research Ethics Committee at the University of Wollongong (2018/044) and ethics committees in each participating country approved all procedures in the SUNRISE Study.

Measurement of Step Count

Step counts were assessed using thigh-worn *activ*PAL accelerometers. The *activ*PAL records time spent sitting/lying, standing, and stepping in 15-second epochs[18] and has been validated for measurement of step counting in preschoolers[19] and older children aged 9–10 years.[20] The *activ*PAL monitors were waterproofed using a piece of Tegaderm transparent dressing. During a visit to the study site, trained research staff used another dressing to place the monitor on the child's right anterior thigh, midway between the hip and knee in the midline. Children were asked to continuously wear the monitors for 3 to 5 days as described previously.[7,17] Parents of participating children were sent a letter with instructions to ensure the monitors were worn properly, and additional tape was provided to reattach the monitor in case it became loose on the child's thigh. The center staff or teachers also helped to ensure that children recruited through early childhood education and care centers, schools, or community centers wore the monitors properly throughout school days. On the last day of data collection, the research staff removed the monitors from participating children at the study site. In some countries (eg, Japan), parents removed the monitors on the morning of the last day and sent them to the study site, where the research staff collected them. To be included in the current study, a child was required to have at least one valid day accelerometry data[21] (ie, data for at least one 24-hr period on either a weekday or weekend). The average daily step count was calculated and classified as meeting or not meeting the 180 minutes per day of TPA based on the threshold of 11,500 steps per day.[7]

Potential Correlates of Time Spent in Physical Activity

There were 5 potential correlates, and these were explored based on what was available from the SUNRISE Study protocol[17] and identified from previous studies.[22] Potential correlates examined

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in this study included the child's sex and age, residential area (urban/rural), parental/caregiver education level, and country income level. As described previously,[7,17] the SUNRISE Study used a modified version of the WHO STEPS survey questionnaire[23] to collect sociodemographic data from participants. The questionnaire was completed by parent/legal guardian self-administration or as an interview with data collectors, for example, where literacy posed challenges.[17] The child's date of birth (or age in complete years if the child's date of birth was not known) was reported by parents, and this was used to determine the child's age in months and years. This was also used to group participants into 2 categories based on their age: 3.0–<4.0 and 4.0–<5.0 years. The child's sex was recorded as either boy or girl. In addition, parents reported the highest education a member of their household completed based on their country's educational classification, and this was dichotomized as low (secondary/high school or below) or high (tertiary education or above) education. This was used as a proxy for family socioeconomic status.[24] The child's residential area was recorded as urban or rural based on the location of the study site where they were recruited. Participating country's income level was defined as lower middle (L-MIC), upper middle (U-MIC), or HIC using the World Bank classification.[25]

Statistical Analysis

Descriptive analyses were conducted to characterize the sample and were presented as mean and SD for continuous data if normally distributed or frequency and percentage (%) for categorical data. Descriptive analyses were also conducted to describe the proportion of children meeting the TPA guideline based on the 11,500 steps per day threshold for the overall sample and each of the sociodemographic variables, and 95% CIs were calculated. The association between potential correlates and adherence to the TPA guideline based on the 11,500 steps per day threshold was modeled using logistic regression. First, univariable analysis was performed to determine the association between meeting the guideline and each of the potential correlates (age, sex, parent education, residential area, and country income level). Potential correlates were retained for use in the multivariable analysis if they were at least marginally significant ($P < .10$).[26]

Multivariable logistic regression analyses were conducted to identify correlates of meeting the TPA guideline based on the 11,500 steps per day threshold. Potential correlates that were identified in the univariable analyses ($P < .10$) were introduced into the multivariable model all at once using the stepwise backward selection method.[27] The final model included all variables determined as correlates of meeting the guideline using Wald P value at 5% significance level. All analyses were conducted in Stata/IC (version 16.1) for Mac.

Results

Of the 955 children with valid *activ*PAL data evaluated in the present study, 797 were aged 3.0–<5.0 years (mean age 4.0 [SD 0.3] y). Participants were from 17 countries: 5 L-MICs, 5 U-MICs, and 7 HICs (Table 1). Table 2 reports the descriptive characteristics of participants included in the present study. The proportion of boys and girls included in our study was similar. Most children were aged 4.0–<5.0 years. A slight majority (52.6%) lived in urban areas, and nearly two-thirds (62.4%) were from L-MICs or U-MICs. Overall, children achieved an average of 10,295 (SD = 4084) steps per day as measured by the *activ*PAL.

Table 1 Proportion of Participants Included in the Present Study by Country and Country's Income Level

Country	Frequency	Percent
High-income countries		
Australia	22	7.3
Canada	29	9.7
Hong Kong	77	25.7
Japan	59	19.7
South Korea	32	10.7
Sweden	76	25.3
United States	5	1.7
Total	300	100.0
Upper middle-income countries		
Brazil	47	15.2
China	103	33.3
Malaysia	69	22.3
South Africa	63	20.4
Sri Lanka	27	8.7
Total	309	100.0
Lower middle-income countries		
Bangladesh	27	14.4
Indonesia	60	31.9
Papua New Guinea	70	37.2
Vietnam	17	9.0
Zimbabwe	14	7.5
Total	188	100.0

Figure 1 (and Supplementary Table S1 [available online]) shows the proportion of participants meeting the TPA guideline. Almost a third (30.9%, 95% CI, 27.6–34.2) of the preschoolers met the TPA guideline. The proportion meeting the TPA guideline was significantly higher among boys, 3-year-olds, rural residents, and those from L-MICs.

Table 3 presents univariable and multivariable analyses of the association between sociodemographic correlates and meeting the TPA guideline. In the univariable analysis, all correlates demonstrated statistically significant associations with meeting the guidelines. The associations for all except parent education remained statistically significant in the multivariable analysis. Girls had significantly lower odds of meeting the guideline compared with boys (adjusted OR [aOR] = 0.70, 95% CI, 0.51–0.96). In addition, older children had significantly lower odds of meeting the guideline (aOR = 0.50, 95% CI, 0.34–0.75). Children had higher odds of meeting the guideline if they were rural residents (aOR = 1.78, 95% CI, 1.27–2.49) or from L-MICs (aOR = 1.35, 95% CI, 0.89–2.04). The U-MIC children were less likely to meet the guideline than those from HIC.

Discussion

Main Findings of This Study

We found that less than one-third of the children aged 3–4 years from 17 countries met the WHO TPA guideline using the validated De Craemer et al[11] threshold of at least 11,500 steps per day as measured by the *activ*PAL. We also found that the odds of meeting

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Table 2 Sociodemographic Characteristics of Participants, Presented as Frequencies and Percentages Unless Otherwise Specified, Along With Their Mean Daily Step Counts

Characteristics	Frequency	Percent	Mean total step count (SD), steps/d		
			Weekday, n = 750	Weekend, n = 214	Overall, N = 797
All	797	100.0	10,241 (4201)	10,279 (3943)	10,295 (4084)
Sex					
Boys	405	50.8	10,460 (4458)	10,562 (4112)	10,490 (4275)
Girls	392	49.2	10,009 (3902)	10,047 (3802)	10,093 (3872)
Age group, y					
3.0 to <4.0	133	16.7	11,751 (4318)	10,807 (3552)	11,764 (4290)
4.0 to <5.0	664	83.3	9936 (4114)	10,178 (4014)	10,000 (3980)
Education class[a]					
High	426	54.8	9682 (3710)	10,161 (3525)	9738 (3621)
Low	352	45.2	10,774 (4604)	10,413 (4309)	10,831 (4441)
Residential area					
Urban	419	52.6	9767 (3961)	9818 (4087)	9709 (3775)
Rural	378	47.4	10,798 (4409)	10,659 (3795)	10,945 (4314)
Country income level					
HIC	300	37.6	10,274 (3359)	9432 (3500)	10,223 (3299)
Upper MIC	309	38.8	9173 (3059)	10,212 (3716)	9369 (3046)
Lower MIC	188	23.6	11,872 (6040)	15,504 (4453)	11,931 (5848)

Abbreviations: HIC, high-income countries; MIC, middle-income countries. Low education class means secondary/high school or below; high education class means tertiary education or above.

[a]Participants with missing information on education class (n = 19).

the guideline were lower among girls and older children and higher among rural residents and children from L-MICs.

What Is Already Known on This Topic

Overall, 30.9% of our sample achieved the TPA guideline. This finding is similar to a recent study involving 6 European countries, which found that 32.7% of the preschoolers aged 3–6 years met the guideline using the same step count-based threshold.[15]

The estimated prevalence of adherence to the TPA guideline observed in the present study is higher than the prevalence observed by Huang and Lee[16] (20%) in a sample of 114 preschoolers aged 3–6 years in Hong Kong. Differences in adherence to the TPA guideline could be due to substantial discrepancies in the sample sizes and ages of the participants. The difference could also be due to the difference in samples with the previous one being a small sample from a highly urbanized HIC (Hong Kong).[16] Higher proportions of children meeting the TPA guideline have been previously reported,[13,22] including in a systematic review and meta-analysis, which found that 78% of 3- to 5-year-old children met the TPA guideline.[28] This difference may be explained by variations in the definition of TPA used in our study compared with studies included in the Bourke et al review.[28] Studies in the review used physical activity duration, and most of them applied the accelerometry cut point described by Evenson et al[29] (eg, > 100 counts per minute) to define TPA, which may have led to a greater proportion of children in these studies meeting the guideline. Again, the authors[28] highlighted the high degree of variation in prevalence of meeting the guideline in the included studies, which is likely to be due, at least partly, to variation in the methodology used to measure time spent in the behaviors. In addition, the systematic review and meta-analysis[28] mainly included studies from HIC, which limits the generalizability of the findings in low- and middle-income countries.

We found that boys were more likely to achieve the TPA guideline than girls. Similar differences in the proportion of boys and girls meeting the guideline based on the 11,500 steps per day threshold have been demonstrated in a previous study.[14] Sigmundova et al[14] found that 47.4% of girls and 54.1% of boys met the 11,500 steps per day threshold in a sample of 194 preschoolers aged 4–7 years in Czech Republic. By contrast, a systematic review and meta-analysis did not find differences between boys and girls in meeting the 180 minutes per day in TPA.[28] We found that a higher proportion of preschoolers from rural areas met the TPA guideline. This finding is consistent with previous research among older children in Mozambique.[26]

What This Study Adds

Understanding of the prevalence and sociodemographic correlates of adherence to the global TPA guideline in geographically and culturally varied samples is an essential part of the behavioral epidemiology framework.[6] The framework is needed to identify whether there is a need to develop interventions and which groups of children are most in need of intervention.[6] The present study suggests that only a minority of 3- to 4-year-olds might meet the WHO TPA guideline globally, with a lower proportion among girls than boys. Taken together, this finding suggests the need to include 3- to 4-year-olds globally in surveillance of physical activity, which is a gap in global surveillance at present.[5,30] If confirmed by other studies, the finding on sex disparity in meeting the TPA guideline also suggests the need to develop interventions to promote equal participation in physical activity and enhance health equity in young children. We also observed that younger children were more likely to achieve the TPA guideline than older children. This suggests the need to promote lifelong participation in physical activities among older children

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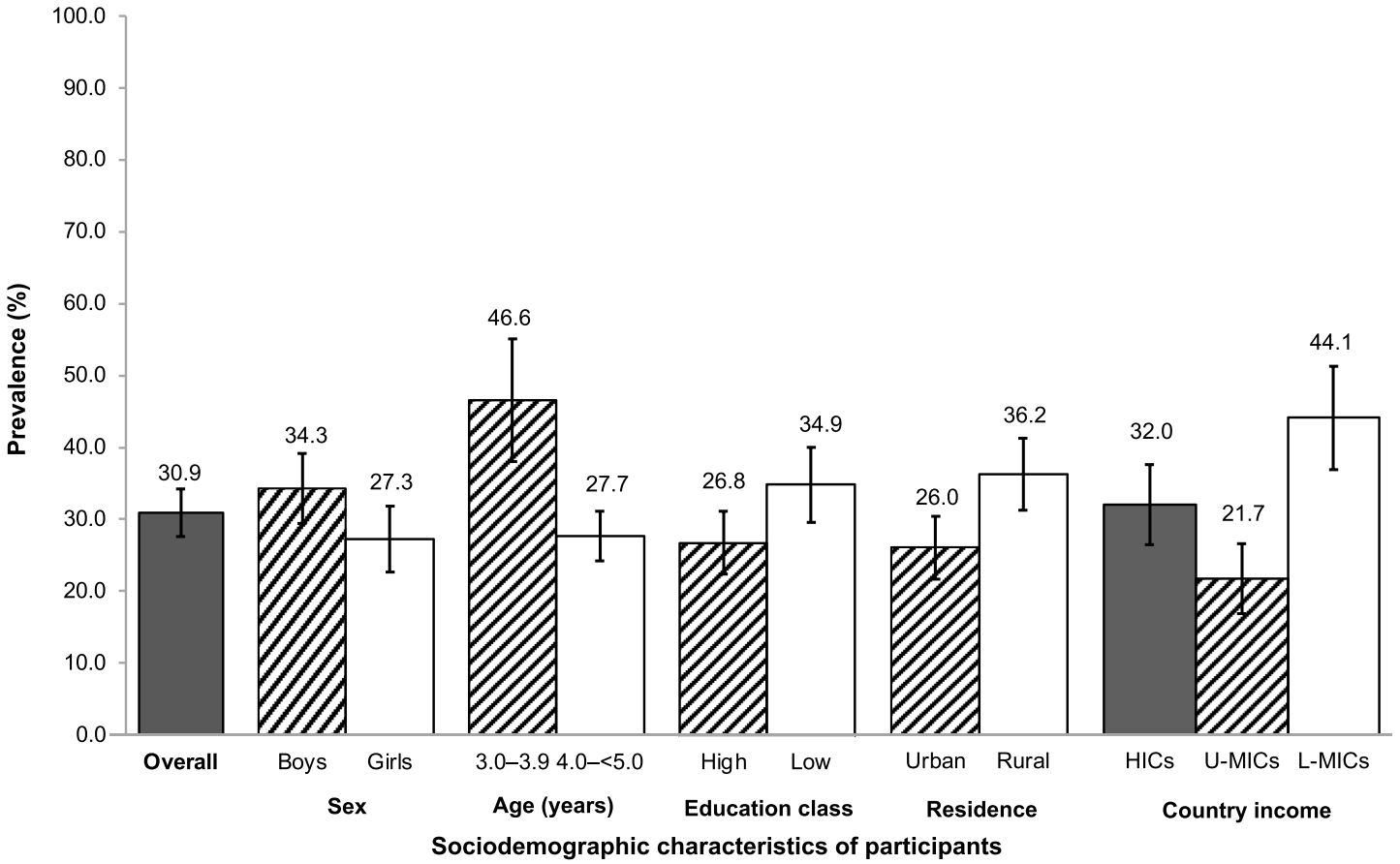


Figure 1 — Prevalence of meeting the WHO TPA guideline based on step count threshold of at least 11,500 steps per day by participant sociodemographic characteristics. The prevalence rate is presented for the overall sample and each of the sociodemographic characteristics of participants. Each bar represents the estimated prevalence of meeting the guideline, and the vertical lines extending from each bar indicate the corresponding 95% CIs. Low education class means secondary/high school or below. High education class means tertiary education or above. HIC indicates high-income countries; L-MIC, lower middle-income countries; TPA, total physical activity; U-MICs, upper middle-income countries; WHO, World Health Organization.

to sustain the health benefits across the lifespan. In addition, the sex differences in adherence to the TPA guideline further highlight the importance of implementing physical activity interventions that also include girls to promote equal and inclusive participation between girls and boys.

Our finding on urban/rural differences in meeting the TPA guideline contributes to the body of knowledge suggesting that urban residents may have, or choose, fewer opportunities for participation in habitual TPA and more options for sedentary activities. This may be the result of lifestyle differences and environmental opportunities and constraints (eg, passive transportation and more screens).[31] In contrast, rural children may typically have more space, more outdoor time, more use of active transportation, more limited access to screens, and possibly more family chores, which may facilitate children in meeting the TPA guideline.[26,31]

The present study identified key correlates associated with meeting the TPA guideline based on De Craemer et al's[11] threshold of 11,500 steps per day. We found that meeting the TPA guideline is related to sex, age, and residential area (urban/rural). In addition, our study revealed that meeting the guideline is also related to country income level, with preschoolers from L-MICs having higher odds of meeting the WHO TPA guideline compared with children from HICs or U-MICs. We found that children from U-MICs had lower odds of meeting the guideline compared with those from HICs. It is plausible that urbanization and modernization might be influencing this finding. However, the finding for U-MICs is unexpected and might be related to economic transitions occurring in those countries compared with HICs. Taken together, these findings draw our attention to the importance of considering varying contexts when planning interventions to promote increases in the prevalence of meeting the global TPA guideline in young children.

Limitations of This Study

Our study has several limitations. Correlates identified in the present study are limited to the available correlates, and most of them were parent reported. Future studies could use a wider range of correlates drawn from the different levels of the social ecological model,[32] including individual- and environmental-level correlates. Our sample was not representative due to nonstandardized recruitment procedures across participating countries during the pilot phase of the SUNRISE Study,[17] which included the use of convenience cluster sampling. Furthermore, it should be noted that the observed prevalence and correlates in the present study may differ within and between countries due to cultural and geographical variations. However, smaller sample sizes for some countries in the

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Table 3 Univariable and Multivariable Analysis of Correlates of Meeting the WHO TPA Guideline Based on the 11,500 Steps Per Day Threshold in Preschool Children

	Univariable			Multivariable[a]		
	OR	95% CI	*P*	OR	95% CI	*P*
Sex			.032			.026
Boys	1	Ref.		1	Ref.	
Girls	0.72	0.53, 0.97		0.70	0.51, 0.96	
Age group in y			<.001			.001
3.0 to 3.9	1	Ref.		1	Ref.	
4.0 to <5.0	0.44	0.30, 0.64		0.50	0.34, 0.75	
Education class			.014			.064
High	1	Ref.		1	Ref.	
Low	1.47	1.08, 2.00		1.38	0.98, 1.95	
Residential area			.002			.001
Urban	1	Ref.		1	Ref.	
Rural	1.62	1.19, 2.19		1.78	1.27, 2.49	
Country income			<.001			<.001
HIC	1	Ref.		1	Ref.	
Upper MIC	0.59	0.41, 0.85		0.49	0.33, 0.72	
Lower MIC	1.68	1.15, 2.45		1.35	0.89, 2.04	

Abbreviations: HIC, high-income countries; MIC, middle-income countries; OR, odds ratio; TPA, total physical activity; WHO, World Health Organization. Low education class means secondary/high school or below; high education class means tertiary education or above.
[a]All variables in the table fitted in the final model at once. All variables in the univariable model met the criteria for inclusion in the multivariable model ($P < .01$).

present study (eg, the United States, n = 5) limited our ability to explore country-level prevalence and correlates. Nevertheless, the pooled sample size used in the present study was both relatively large and novel in having a diverse international sample, with adherence to the TPA guideline assessed using a validated and culturally appropriate device-based measure.[7] Such measures are currently lacking, thus limiting cross-country and global surveillance studies in young children.[5,30] Future larger studies using a standardized protocol are planned with more representative sample sizes around 1000 children per country as part of the SUNRISE Main Study initiative, and these will provide more definitive evidence,[17] but studies like the present one show the need for such future larger studies focusing on cross-country variations.

Challenges experienced by children while wearing *activ*PAL have previously been reported (eg, discomfort and irritation from the device placement on the thigh, skin rashes).[17] This may have affected the wear time compliance among participants, which may have influenced the observed findings. However, our findings were similar to the European study[15] that used different devices and placements. As such, our findings may be generalizable across different devices and placements. The lack of participants from low-income countries based on the World Bank classification adds further caution regarding the generalizability of these findings. Levels and correlates of physical activity may be different across different cultural contexts.[33] Nevertheless, our study included participants from 5 L-MICs, which are underrepresented in most physical activity studies.[28] We used at least one valid day accelerometry data in our analyses (ie, n = 750 children with at least one valid weekday for a total of 1507 valid days and n = 214 children with at least one valid weekend day data for a total of 349 valid days); however, a single day of observation is appropriate for surveillance studies, which focus on providing group- or population-level physical activity estimates.[34] In addition, we calculated pooled prevalence estimates for meeting the TPA guideline, yet evidence from HIC suggests differences in physical activity patterns during weekdays and weekend days.[15] However, the present study included participants from MICs where it is not yet clear whether physical activity behavior patterns in young children differ during weekdays and weekend days. Future cross-country studies should, therefore, examine prevalence and correlates of meeting the TPA guideline in young children during weekdays compared with weekends. Finally, the WHO TPA guideline in 3- to 4-year-olds includes moderate- to vigorous-intensity physical activity recommendation, so further research that takes into account moderate- to vigorous-intensity physical activity is needed.

This study also has important strengths including the use of a relatively large and globally diverse sample that adds to the limited literature and furthers our understanding of how step counting could inform the WHO physical activity guideline in 3- to 4-year-olds globally, including L-MICs and U-MICs. The present study helps to fill an important gap in the literature by suggesting that the prevalence of meeting the global TPA guideline may differ by country income levels.[35] Another strength is the use of a validated step-based threshold corresponding to the 180 minutes per day of TPA that has been recommended for global monitoring of adherence to the WHO physical activity guideline in early childhood.[7] This will be important to inform public health interventions aimed to promote physical activity in young children globally.

Conclusions

This study set out to understand how step counting can effectively inform the WHO physical activity guideline. We found that meeting the WHO TPA guideline may be relatively uncommon among 3- to 4-year-olds globally. Boys, younger children, and

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children from rural areas may have a higher prevalence of meeting the TPA guideline. These findings enhance our understanding of the value of simple device-based methods of measuring physical activity and suggest that they might be useful in surveillance and in using the behavioral epidemiology framework as it applies to physical activity in young children globally. The present study also suggests that interventions to promote and preserve adherence to the TPA guideline for the promotion of healthy growth and development in young children globally should consider the varying contexts around the world.

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