RAPHAEL HENRIQUE DE OLIVEIRA ARAUJO

O CRITÉRIO DE POUCA OU NENHUMA ATIVIDADE FÍSICA MODERADA VIGOROSA: PREVALÊNCIAS GLOBAIS, DESIGUALDADES DE GÊNERO E CORRELATOS MACROECONÔMICOS E SOCIAIS ENTRE ADOLESCENTES

Londrina
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Orientador: Prof. Dr. Danilo Rodrigues Pereira da Silva

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Banca examinadora:

Orientador: Prof. Dr. Danilo R. P. Silva
Universidade Federal de Sergipe

Prof. Dr. Profa. Dra. Andrea Ramirez Varela
University of Texas

Profa. Dra. Andrea Tuchtenhagen Wendt
Pontifícia Universidade Católica do Paraná

Prof. Dr. Diego Augusto Santos Silva
Universidade Federal de Santa Catarina

Prof. Dr. Gilmar Mercês de Jesus
Universidade Estadual de Feira de Santana

Londrina, 21 de fevereiro de 2025.

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“[...] by studying health, we learn something about society, and by studying society, we learn something about health.”

- Sir Michael Marmot, *The Life Scientific* (BBC Radio 4)

Araujo, Raphael Henrique de Oliveira. **O critério de pouca ou nenhuma atividade física moderada vigorosa: prevalências globais, desigualdades de gênero e correlatos macroeconômicos e sociais entre adolescentes.** 2024. 130. Tese (Doutorado em Ciências da Saúde) – Centro de Ciências da Saúde. Universidade Estadual de Londrina, Londrina, 2025.

Resumo

Introdução: A Organização Mundial da Saúde (OMS) recomenda que adolescentes pratiquem, em média, 60 minutos diários de atividade física moderada-vigorosa (AFMV). No entanto, benefícios à saúde podem ser obtidos mesmo com níveis de AFMV abaixo das recomendações. Apesar disso, estudos de vigilância têm focado quase que exclusivamente em critérios baseados nas recomendações da OMS, o que invisibiliza os grupos mais necessitados, bem como adia discussões sobre desigualdades que podem ter início no acesso à prática de atividade física. **Objetivo:** Investigar a prevalência global de atividade física entre adolescentes, possíveis desigualdades de gênero e associações com indicadores macroeconômicos e sociais. **Métodos:** Foram analisados 146 inquéritos nacionais (adolescentes de 11 a 19 anos). O critério de ≥60 minutos por dia de AFMV em menos do que um dia por semana foi utilizado para classificar os adolescentes com "pouca ou nenhuma AFMV". Já a prática de ≥60 minutos por dia de AFMV durante sete dias por semana foi utilizada como critério para classificar aqueles que alcançavam as recomendações de atividade física da OMS. Informações sobre atividade física, gênero e idade foram autorrelatados, enquanto as informações macroeconômicas e sociais (IDH, GII e GINI) foram coletadas a partir de sites oficiais. A análise estatística incluiu frequências relativas e razões de prevalência (RP), com seus respectivos Intervalos de Confiança de 95% (IC95%). Modelos de meta-análise foram empregados para as estimativas harmonizadas. As relações dos indicadores macroeconômicos e sociais com a prevalência e as desigualdades em atividade física foram exploradas por meio do coeficiente de correlação de Spearman. **Resultados:** A prevalência de alguma atividade física foi de ~80%, sendo mais elevada entre países da América do Norte e Europa & Ásia Central (94%) em relação às demais regiões (<77%). Desigualdades de gênero foram consistentes entre os países analisados. Maiores prevalências de atividade física (ambos os critérios) foram notadas entre países com melhores indicadores macroeconômicos e sociais. Enquanto maiores desigualdades de gênero em alguma AFMV foram notadas entre países com IDH, GII e GINI menos favoráveis, direções opostas foram notadas quando o cumprimento com as recomendações foram o desfecho. **Conclusão:** Dois a cada dez adolescentes não realizam ao menos 60 minutos de AFMV em nenhum dia na semana, sendo os cenários menos favoráveis observados em países do Sul Global. A desigualdade de gênero é um problema consistente, especialmente entre os adolescentes mais velhos. Enquanto as prevalências de atividade física tendem a ser mais elevadas entre países com melhores indicadores macroeconômicos e sociais, a relação entre esses indicadores e a prática de atividade física parece variar de acordo com o critério utilizado para classificação da atividade física.

Palavras-chave: Atividade Física; *Global School-based Student Health Survey*; *Health Behavior Among School-aged Children*; Iniquidade em Saúde; Jovens Vigilância em Saúde Pública;

Araujo, Raphael Henrique de Oliveira. **The criterion of no or low moderate-vigorous physical activity: global prevalence, gender inequalities, and its macroeconomic and social correlates among adolescents**. 2024. 130p. Thesis (PhD in Health Sciences) – Health Sciences Center. State University of Londrina, Londrina, 2025.

Abstract

Background: The World Health Organization (WHO) recommends that adolescents engage in an average of 60 minutes of moderate-to-vigorous physical activity (MVPA) daily. However, even with MVPA levels below the recommendations, health benefits can be obtained. Despite that, surveillance studies have focused on criteria based on WHO recommendations for classifying physical activity, making the unfavored groups invisible and postponing discussions on inequalities that may begin with access to physical activity. Aim: To investigate the global prevalence of physical activity among adolescents, possible gender inequalities, and associations with macroeconomic and social indicators. Methods: We analyzed data from 146 countries/territories (adolescents aged 11 to 19 years). The cutoff of ≥60 minutes per day of MVPA on <1 day per week was used to classify adolescents as having “no or low MVPA”, while the cutoff of ≥60 minutes per day of MVPA for seven days a week was used to classify those who met the WHO physical activity recommendations. Information on physical activity, gender, and age was self-reported, while macroeconomic and social information (HDI, GII, and GINI) was collected from official websites. Statistical procedures included relative frequencies and prevalence ratios (PR), with their respective 95% Confidence Intervals (95%CI). Meta-analysis models were used for harmonized estimates. The relationships of macroeconomic and social indicators with the prevalence and inequalities in physical activity were explored using Spearman's correlation coefficient. Results: The practice of some MVPA was reported by approximately 80% of adolescents, with higher prevalences among North American and European & Central Asian countries (~94%), while values lower than 77% were observed in the other regions. Gender inequalities were consistent among the analyzed countries. Countries with better macroeconomic and social indicators showed a higher prevalence of some MVPA and compliance with physical activity recommendations. However, while higher gender inequalities in some MVPA were observed among countries with less favorable HDI, GII, and GINI, the higher inequalities in compliance with the recommendations occurred among countries with more favorable macroeconomic and social indicators. Conclusion: 2 out of 10 adolescents reported not accumulating ≥60 min of MVPA at least 1 day per week, with the least favorable scenarios observed among Global South countries. Gender inequality is consistent across countries, especially among older adolescents. While the prevalence of physical activity tends to be higher among countries with better macroeconomic and social indicators, the correlation between these indicators and physical activity practice seems to vary according to the criterion used for physical activity classification.

Keywords: Global School-based Student Health Survey; Health Behavior Among School-aged Children; Inequality; Surveillance; Youth.

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Atividade física de intensidade moderada a vigorosa (AFMV)

Demographic and Health Surveys (DSH)

Gender Inequality Index (GII)*Global School-based Health Survey* (GSHS)

Health Behaviour in School-aged Children study (HBSC)

Índice de Desenvolvimento Humano (IDH)

Organização Mundial da Saúde (OMS)

Pesquisa Nacional de Saúde do Escolar (PeNSE)

Sumário

1. Introdução expandida

Período Moderno da Epidemiologia da Atividade Física, um breve contexto

No final da década de 1940, junto com seu grupo de pesquisa, Jeremy Noah Morris deu início a investigações utilizando a atividade física como exposição para desfechos relacionados a doenças cardiovasculares. O primeiro estudo dessa série, publicado na revista The Lancet, em 1953,[1] utilizou informações de trabalhadores de um sistema de transporte de Londres. Os desfechos investigados foram incidência de angina e incidência de infarto. Os autores consideraram o tipo de trabalho como exposição, sendo o grupo menos ativo composto por motoristas e, o mais ativo, por cobradores. Aqui, é válido ressaltar que os veículos eram de dois andares, o que fazia com que os cobradores, além de caminharem pelos corredores dos ônibus, subissem e descessem as escadas diversas vezes por dia. Como resultado da pesquisa, observou-se que o risco de desfecho cardiovascular foi maior entre motoristas do que entre cobradores. Embora não tenha sido o intuito de trabalho explorar possíveis mecanismos, as evidências iniciais levantadas instigaram investigações subsequentes, as quais exploraram possíveis efeitos protetores da atividade física, dando início ao que ficou conhecido como o Período Moderno da Epidemiologia da Atividade Física.[2]

Em um contexto mais amplo, Epidemiologia se refere ao estudo da frequência e distribuição de eventos em saúde, incluindo a análise de seus determinantes.[3] No âmbito da Epidemiologia da Atividade Física,[4] estudos sobre frequência estão relacionados à prevalência de indivíduos ativo/inativos em uma determinada população ou a incidência de atividade física ou inatividade física em um período conhecido.[5] Análises de distribuição partem do pressuposto de que nem sempre prevalências/incidências são homogêneas entre subgrupos populacionais, e assim, têm o intuito de identificar possíveis diferenças entre grupos nessas frequências. Análises de determinantes buscam identificar possíveis fatores que proporcionam alguns subgrupos populacionais serem mais ativos do que outros, como por exemplo, escolaridade e renda. Além disso, estudos sobre determinantes também podem ter a atividade física como exposição, ao invés de desfecho, buscando assim analisar como a atividade física pode estar associada a desfechos em saúde.

É notável o aumento de pesquisas com foco em atividade física ao longo do último século. Por exemplo, em uma pesquisa utilizando o termo “(“physical activity” [title/abstract)”, no PubMed, foram reportados 5 resultados entre 1951 e 1960. Entre

1961 e 1970, foram 218 resultados, e entre 2011 e 2020, 78.838 resultados (Figura 1). A expansão do conhecimento sobre correlatos/determinantes e efeitos da atividade física também envolveu outros subgrupos populacionais, como idosos, gestantes, pessoas vivendo com doenças crônicas não transmissíveis, crianças e adolescentes.[6]

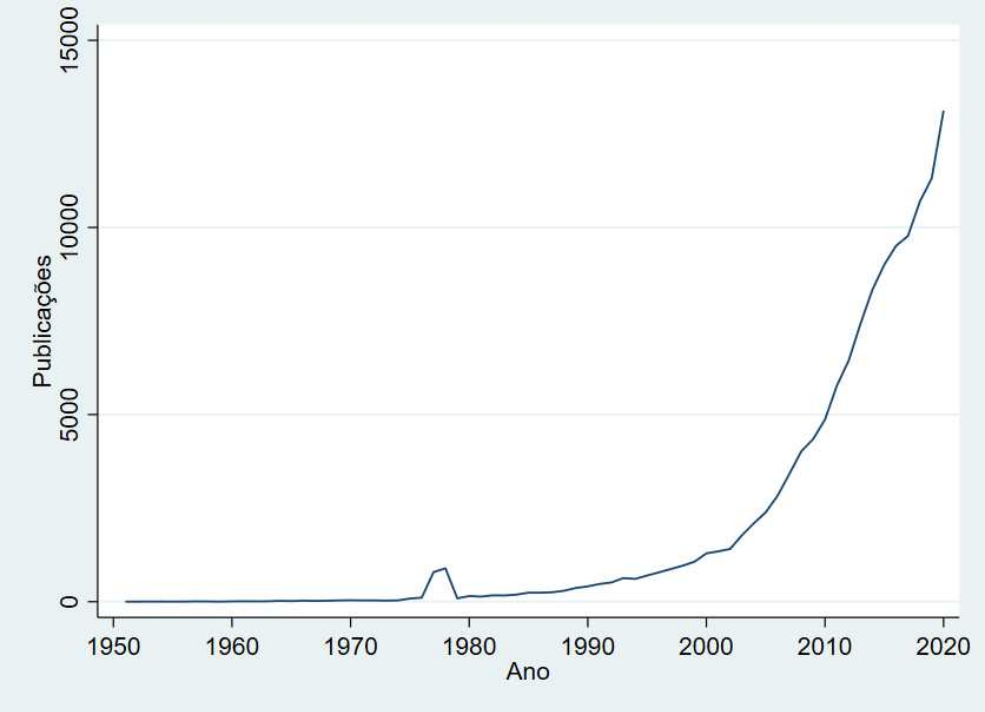

Figura 1 - Busca realizada no PubMed apresentado o número de publicações por ano, utilizando o termo “physical activity”, com restrição a títulos e resumos.

Adolescência e atividade física

De acordo com a Organização Mundial da Saúde (OMS), a adolescência é compreendida como o período de vida entre a infância e a idade adulta, que vai dos 10 aos 19 anos,[7] sendo caracterizada por uma fase de mudanças físicas e sociais, maior independência, estabelecimento de comportamentos e estilo de vida. Condições de saúde nesta fase são determinadas tanto por experiências na infância, quanto por experiências que ocorrem durante a própria adolescência. Além disso, comportamentos apresentados durante a adolescência também podem estar relacionados a desfechos em saúde posteriormente, os quais envolvem o consumo de álcool, tabaco e a prática de atividade física.[8]

Especificamente sobre atividade física, em artigo publicado anteriormente por Hallal et al.,[9] em 2006, os autores trazem um modelo teórico que ilustra como ser mais ativo durante a adolescência poderia apresentar benefícios ao longo da vida do indivíduo. Os autores destacam uma associação entre a prática de atividade física na adolescência e a prática de atividade física na idade adulta (*tracking*), indicando que ser mais ativo durante a adolescência aumenta a probabilidade de comportamentos ativos na idade adulta, o que também vem sendo apoiado por estudos mais recentes.[9,10] Hallal et al.[9] ainda apontam que a prática de atividade física na adolescência está associada à uma menor probabilidade de morbidade na adolescência, o que tem o apoio do corpo de evidência que dá suporte às recomendações de atividade da OMS mais recentes,[11] o qual envolveu 14 artigos de revisão sistemática, incluindo 9 desfechos [aptidão física, saúde cardiometabólica, saúde óssea, adiposidade, efeitos adversos (por exemplo, lesões), saúde mental, desfechos cognitivos, comportamentos psicossociais e sono].

Por conseguinte, ainda que evidências sobre a associação entre atividade física durante a adolescência e benefícios à saúde na idade adulta sejam menos disponíveis, resultados mais favoráveis têm sido encontrados para aqueles mais ativos.[12,13] Por exemplo, Feter et al.,[14] utilizando dados de uma coorte prospectiva britânica [1958 *National Child Development Study*], identificaram que adolescentes que relataram maior envolvimento em atividade física aos 16 anos tiveram menor risco de mortalidade por todas as causas, independentemente do autorrelato de atividade física na idade adulta. Ainda, dada a importância de entender o papel da prática de atividade física em momentos específicos na vida dos indivíduos (p.ex: padrões/trajetórias de atividade física durante as primeiras décadas de vida) sobre desfechos em saúde na idade adulta (p.ex: incidência de transtornos mentais), a comunidade científica tem sugerido a necessidade de avanços em linhas de pesquisa relacionadas à atividade física ao longo da vida e os seus desdobramentos, especialmente no que tange a mensuração da exposição em mais de um momento.[15]

Desse modo, a constante consolidação do conhecimento a respeito das associações entre prática de atividade física e desfechos em saúde permitiu a que diferentes organizações elaborassem recomendações sobre a prática de atividade física, incluindo a OMS, a qual teve a recomendação mais recente publicada em 2020.[16]

Recomendações de atividade física para adolescentes

Com o intuito de dar suporte a intervenções, bem como orientar profissionais e a população em geral a respeito da prática de atividade física, a comunidade científica tem buscado reunir e analisar as evidências disponíveis, sugerindo assim recomendações para diferentes grupos populacionais. Esse processo permite também a atualização de recomendações vigentes conforme a consolidação de novos conhecimentos.

As primeiras recomendações de atividade física, apresentadas na década de 1970, não traziam ainda sugestões para adolescentes, sendo direcionadas apenas para a população adulta.[17] Essas recomendações se pautavam, especialmente, na melhoria da aptidão física, com sugestões mais focadas na prática de atividade física de intensidade vigorosa. Em 1988, o Colégio Americano de Medicina do Esporte publicou uma nota de opinião intitulada “Aptidão Física entre Crianças e Adolescentes”,[18] sugerindo a prática diária de 20 a 30 minutos de exercício vigoroso. Nessa mesma nota, os autores também destacaram a necessidade de mais evidência para a definição da quantidade necessária de exercício para função física e saúde.

Com o aumento das evidências sobre atividade física de intensidade moderada a vigorosa, as recomendações de atividade física passaram a ficar mais próximas da saúde pública, mudando o foco do exercício para atividade física. Aqui, é válido ressaltar que enquanto o termo “exercício físico” refere-se a atividades físicas planejadas, estruturadas, repetitivas e com fins relacionados à melhoria ou manutenção de um ou mais componentes da aptidão física, o termo “atividade física” refere-se a qualquer movimento produzido por músculos esqueléticos que resulte em gasto energético.[19] Por conseguinte, em um consenso publicado em 1994, recomendou-se que adolescentes deveriam ser ativos diariamente ou quase diariamente, bem como deveriam se engajar em ao menos três sessões de pelo menos 20 minutos de atividade física de intensidade moderada a vigorosa (AFMV) durante ao menos três vezes por semana.[20] Posteriormente, essas recomendações foram revisadas e, em 1998, Cavill, Biddle e Sallis[21] publicaram um consenso sugerindo que crianças e adolescentes acumulassem ao menos 60 minutos por dia de AFMV, bem como o deveriam praticar atividades de fortalecimento muscular ao menos duas vezes por semana. Uma recomendação similar foi publicada pela OMS nas diretrizes de atividade física de 2010, alterando a sugestão de ao menos dois para ao menos três dias de atividades de fortalecimento muscular e ósseo.[22] Em 2020, foi publicada uma atualização das recomendações da OMS, sugerindo que crianças e adolescentes acumulassem, em média, 60 minutos por dia de AFMV, mantendo as considerações sobre as atividades de fortalecimento muscular e ósseo publicadas em 2010.[23]

Atividade física, vigilância e prevalência

A vigilância em saúde refere-se a coleta sistemática de dados em saúde, bem como a sua análise e interpretação, sendo essas informações essenciais para o planejamento, implementação e avaliação de ações no âmbito da Saúde Pública.[24] Um exemplo de coleta sistemática de dados é o programa *Demographic and Health Surveys* (DSH), o qual tem coletado, analisado e disseminado informações envolvendo indicadores de saúde populacionais. Tipicamente, as coletas do DHS são conduzidas a cada cinco anos e os microdados podem ser acessados por meio de solicitação formal através seu do *website* (https://dhsprogram.com).

Como abordado anteriormente, a atividade física tem sido constantemente identificada como um fator de proteção contra diferentes desfechos negativos em saúde, e como consequência, muitas pesquisas têm buscado levantar informações sobre a prática de atividade física da população. Entre adolescentes, duas pesquisas destacam-se globalmente, sendo elas o *Global School-based Health Survey* (GSHS) e o *Health Behaviour in School-aged Children study* (HBSC). Tanto o GSHS quanto o HBSC são pesquisas de base escolar, conduzidas à nível nacional/regional, que coletam informações por meio de questionários autorrelatados, e que utilizam a mesma questão para mensurar a prática global de AFMV.[25] Os microdados dessas pesquisas estão disponíveis em seus respectivos *websites*,[26,27] fornecendo informações importantes para o monitoramento da prática de atividade física entre adolescentes.

Usando os microdados do HBSC e do GSHS, um artigo publicado por Hallal et al.,[28] em 2012, reuniu informações de 105 países/territórios, identificando que, globalmente, 80,3% dos adolescentes não alcançavam ao menos 60 minutos diários de AFMV. Em uma proposta similar, Guthold et al.[29] buscaram atualizar e expandir os achados de Hallal et al.,[28] utilizando não apenas os microdados do HBSC e do GSHS, mas incluindo também microdados disponíveis de outros países, como aqueles da Pesquisa Nacional de Saúde do Escolar (PeNSE), do Brasil. O trabalho de Guthold et al.[29] analisou informações de 146 países/territórios e seus indicaram que 81,0% dos adolescentes não alcançavam as recomendações de atividade física.

Apesar da importância de pesquisas nacionais para a vigilância, os questionários comumente aplicados nessas pesquisas têm o intuito de investigar uma série de fatores de risco e proteção à saúde, os quais estão para além da atividade física. Assim a seção reservada para atividade física nem sempre permite entender o fenômeno de uma forma mais ampla. Desse modo, outras inciativas têm sido realizadas com o intuito de fazer

um levantamento global sobre a prática de atividade física entre adolescentes, como é o caso da Global Matrix. A Global Matrix é uma iniciativa liderada pelo *Active Healthy Kids Global Alliance*, e tem como o intuito compilar informações sobre indicadores de atividade física entre adolescentes de diferentes países.[30] Além do percentual de adolescentes que alcançam os *guidelines* de atividade física, os indicadores da Global Matrix incluem informações como a participação em práticas esportivas, brincadeiras ativas, ambiente escolar e a presença de facilitadores de atividade física. Os escores produzidos pela Global Matrix são calculados a partir de estimativas individuais dos países parceiros, e divulgadas através de *Report Cards*, havendo um escore sumarizando as estimativas de todos os países. Atualmente, 56 países fazem parte da Global Matrix, sendo 74% deles classificados com IDH muito alto, 19 com IDH alto e 7% com IDH médio ou baixo.

De uma forma geral, os estudos têm mostrado uma elevada prevalência de inatividade entre adolescentes, variando de 67-73% a 83%, indicando a necessidade de ações para reverter o cenário desfavorável. A Tabela 2 apresenta um resumo dos artigos que buscaram identificar a prevalência global de atividade física. Observa-se que, no trabalho de Aubert et al.,[31] as prevalências de atividade física foram superiores àquelas reportadas por Hallal et al.,[28] Guthold et al.[29] e Marques et al.,[32] o que pode ser explicado, ao menos parcialmente, pelos critérios adotados para codificação dos adolescentes como “ativos” e por diferenças de amostra, com Aubert et al.[31] investigando especialmente países de IDH alto e muito alto.

Tabela 1 - Estudos que buscaram identificar a prevalência global de atividade física entre adolescentes.

	Aubert et al.[31]	Hallal et al.[28]	Guthold et al.[29]	Marques et al.[32]
Países (n)	57	105	146	105
Instrumento	Questionário e acelerômetro	Questionário	Questionário	Questionário
Critério	Uma média de ao menos 60 min/dia de AFMV, ou alcançar ao menos 60 min/dia de AFMV pelo menos quatro dias por semana	Ao menos 60 min/dia de AFMV	Ao menos 60 min/dia de AFMV	Ao menos 60 min/dia de AFMV
Prevalência de atividade física (%)	27–33	19,7	19,0	17,2

Nota: AFMV, atividade física moderada-vigorosa.

Adolescentes poderiam se beneficiar com acúmulos de atividade física abaixo das recomendações?

Está bem documentado que indivíduos que alcançam as recomendações de atividade física demonstram uma redução no risco de desfechos negativos à saúde.[23] Embora os *guidelines* busquem recomendar níveis adequados de atividade física para a promoção saúde, bem como dar suporte a classificações objetivas para vigilância em atividade física, não é o intuito indicar uma quantidade efetiva mínima de atividade física para a promoção de benefícios à saúde.[33] Nesse sentido, estudos que buscaram identificar uma associação dose-resposta entre atividade física e desfechos em saúde têm demonstrado que mesmo níveis de atividade física abaixo dos *guidelines* podem apresentar importantes efeitos protetores.[33] Por exemplo, em um estudo agrupando diferentes coortes, Moore et al.[34] identificaram que, quando comparados àqueles que não realizam atividade física no lazer (zero MET-h/semana de atividade física moderada-vigorosa), indivíduos com um nível entre 0,1 a 3,74 MET-h/semana (aproximadamente 75 minutos/semana de caminhada) apresentaram uma redução média de 19% no risco de mortalidade por todas as causas.

Apesar das associações dose-resposta entre atividade física e desfechos em saúde serem mais exploradas em adultos do que em adolescentes, estudos têm apontado que adolescentes com um nível intermediário de atividade física tendem a apresentar indicadores de saúde mais favoráveis do que seus pares menos ativos.[35,36] Nesse contexto, em uma investigação buscando identificar a associação entre atividade física e dislipidemia, LeBlanc e Janssen[37] identificaram que, quando comparados àqueles com zero minuto por dia de AFMV, a chance de ter níveis inadequados de HDL era reduzida com 15 (Odds Ratio: 0,29, IC95%: 0,13 – 0,67), 30 (Odds Ratio: 0,24, IC95%: 0,10 – 0,64) e 60 minutos de AFMV por dia (Odds Ratio: 0,21, IC95%: 0,07; 0,61). Usando o mesmo grupo de referência, os autores também identificaram que a chance de níveis inadequados de triglicerídeos foram reduzidas com 15 (Odds Ratio: 0,40, IC95% 0,18 – 0,76), 30 (Odds Ratio: 0,22, IC95% 0.06; 0.66) e 60 minutos de AFMV por dia (Odds Ratio: 0,10, IC95% 0,01; 0,51). De formar similar, um estudo conduzido por Mark e Janssen[35] identificou que a chance de ter hipertensão foi menor de entre aqueles que acumularam 30 (Odds Ratio: 0,50, IC95% 0,28 – 0,64) e 60 minutos por dia de AFMV (Odds Ratio: 0,38, IC95% 0,17; 0,52) do que entre aqueles com zero minuto/dia de AFMV. Estudos longitudinais também têm dado suporte a causalidade nas associações entre acúmulos de AFMV abaixo dos guidelines e efeitos protetores contra desfechos negativos em saúde. Em estudo conduzido por Stamatakis et al.,[38] buscou-se identificar

a associação entre AFMV de adolescentes aos 11-12 e indicadores de risco cardiometabólicos aos 15-16. As análises revelaram associações lineares entre AFMV (a cada 10 minutos) e redução da massa gorda e score cardiometabólico, bem como aumento do HDL.

Assim, em uma perspectiva de saúde pública, a adoção de critérios que possam melhorar a captura de informações a respeito dos grupos que estão no extremo mais baixo de atividade física poderia ser um avanço em estudos de vigilância em atividade física.

Uso do critério de "pouca ou nenhuma atividade física moderada a vigorosa" como estratégia de vigilância em atividade física

Embora acúmulos de AFMV abaixo daqueles recomendados por *guidelines* vigentes possam apresentar efeitos benéficos sobre a saúde de adolescentes, de um modo geral, estudos em vigilância da atividade física têm se pautado em identificar a prevalência daqueles que cumprem as recomendações internacionais.[28,29,31] Assim, apesar da importância de levantar informações sobre a prevalência de atividade física, algumas limitações devem ser pontuadas. O uso de um ponto de corte de 60 minutos diários de AFMV faz com que aqueles que relatam acumular entre zero e seis dias por semana de ao menos 60 minutos por dia de AFMV sejam classificados "inativos", o que pode esconder informações importantes sobre os grupos mais necessitados em relação a prática de AFMV.[35,37] Ou seja, há uma limitação em identificar os adolescentes com pouca ou nenhuma AFMV.

O uso de pontos de corte unicamente baseados nos *guidelines* também apresenta limitações para a análise de desigualdades em atividade física. Por exemplo, estudos prévios têm buscado identificar diferenças na prevalência de atividade entre países/regiões, bem como entre subgrupos populacionais, com estratificações por sexo/gênero, escolaridade e renda. No entanto, é possível que as diferenças entre os grupos não estejam necessariamente entre aqueles que alcançam as recomendações. Assim, é possível que dois países apresentem uma prevalência similar de atividade física (cumprir os *guidelines*) ao mesmo tempo em que há uma desigualdade na prevalência de pouca ou nenhuma AFVM. Para ilustrar melhor esse cenário, foram utilizados dados do GSHS,[26] provenientes da Argentina e do Egito, os quais apresentaram uma prevalência similar de atividade física (16,5% versus 14,1%); no entanto, o percentual de argentinos que relataram zero dia por semana de AFMV foi de

17,9%, enquanto o de egípcios foi de 28,9% (Figura 2). Assim, é possível supor que os países parecem apresentar diferenças na cobertura de atividade física.

Em estudos de tendência, usar unicamente um ponto de corte baseado nos *guidelines* também pode inserir algumas limitações. Por exemplo, ao se pautar em 60 minutos por dia de AFMV para classificar adolescentes como ativos, incrementos nas outras categorias não serão captados pela análise. Assim, caso haja uma redução do percentual de adolescentes que relatam nenhum dia de AFMV por semana, seguido por um aumento da prevalência de dois e três dias por semana, esses aumentos não serão notados. Poder-se-ia então inferir, erroneamente, que as tendências não são favoráveis. Portanto, além de analisar a prevalência de adolescentes que alcançam as recomendações de atividade física, identificar aqueles com pouca ou nenhuma AFMV poderia ser abordagem útil para compreender o cenário acerca dos grupos mais necessitados em relação à prática atividade física.

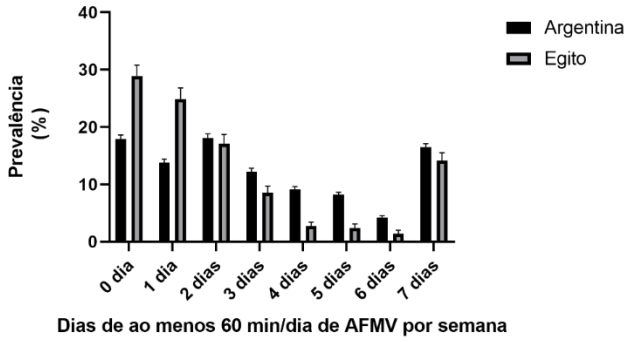

Figura 2 - Prevalência de ao menos 60 min/dia de AFMV por semana entre adolescentes argentinos e egípcios. AFMV, atividade física moderada-vigorosa.

Desigualdades de gênero em atividade física: estimativas globais

Determinantes sociais em saúde dizem respeito a como as condições de vida e trabalho estão relacionadas a contextos de saúde da população.[39] A análise dos determinantes sociais tem o poder de revelar os subgrupos populacionais que são mais ou menos favorecidos em relação a um determinado desfecho, sendo também possível investigar se as diferenças encontradas são ou não injustas, desnecessárias e evitáveis. Ou seja, é possível identificar se há iniquidades em relação ao fenômeno observado.[40]

No âmbito da epidemiologia da atividade física, embora ainda seja desafiador harmonizar e analisar informações sobre a associação entre indicadores socioeconômicos e a prática de atividade física em uma perspectiva global (discussão aprofundada nos tópicos subsequentes), estudos prévios identificaram que alguns subgrupos populacionais são constantemente mais fisicamente ativos do que outros. Por exemplo, usando amostras de diferentes países, estudos conduzidos por Gulthold et al. buscaram identificar prevalências de atividade física e possíveis desigualdades de gênero, com achados revelando diferenças absolutas de 7,1 p.p. entre adolescentes e adultos 8,3 p.p. entre adultos (favoráveis aos meninos/homens).[29,41]

Evidências têm indicado que diferenças de gênero iniciam em idade pré-escolar e são observadas ao longo da vida. Em estudo prévio utilizando dados de coortes brasileiras, Ricardo et al. harmonizaram e analisaram informações de atividade física mensurada por dispositivos com o intuito de identificar desigualdades ao longo de diferentes faixas etárias. Os autores observaram que desigualdades são consistentes do primeiro ao sexagésimo ano de vida (período coberto pelas análises), com uma diferença média diária de 19,3 minutos de AFMV.[42]

Normas de gênero constituem os principais explicadores para as desigualdades entre meninos/homens e meninas/mulheres em atividade física, com estudos apresentando como diferentes expectativas sociais agem como barreiras para a prática de atividade. Meninos tendem a receber maior suporte familiar e escolar a respeito do engajamento em atividades fisicamente atividade,[43,44] enquanto meninas são direcionadas para assumir maior participação em atividades domésticas. Nesse sentido, um estudo[45] com escolares (idade: 9,1 ± 1,4) revelou que meninas reportaram menor participação em brincadeiras ativas do que meninos, enquanto a participação de meninas em atividades domésticas foi o dobro daquela reportada pelos meninos. Na vida adulta, outros fatores relacionados a normas de gênero também podem estar associados a redução da prática de atividade física. Nesse sentido, um estudo conduzido com mulheres vivendo na Austrália revelou que tanto o matrimônio quanto a maternidade estiveram associados a redução da atividade física, o que pode indicar um afastamento das práticas de atividade física como consequência de sobrecargas tanto de trabalhos domésticos quando de cuidados parentais.[46]

Além das barreiras citadas anteriormente, não se pode passar despercebida a existência da institucionalização da proibição da participação de mulheres em atividades esportivas. Por exemplo, no Brasil, o Decreto de Lei nº 3.199/1941, vigente entre 1941 e 1979, impedia mulheres de participar de atividades esportivas como futebol, *rugby*,

polo e polo aquático, afetando o desenvolvimento dessas modalidades, bem como reverberando em normas de gênero observadas ainda hoje.[47]

Tendo em vista os achados supracitados, é importante fazer algumas considerações sobre decisões tomadas na presente tese. Embora inquéritos populacionais coletem informações a respeito do "sexo", explicações para diferenças em atividade física entre meninos/homens e meninas/mulheres são, sobretudo, sociais. Desse modo, o autor optou em utilizar o termo "gênero" ao invés de "sexo". Esta escolha tomou como referência o livro "Como e por que as desigualdades sociais fazem mal à saúde"[40]. Assim, espera-se avançar em discussões sobre como expectativas sociais moldam papéis femininos e masculinos em uma determinada população, superando explicações para desigualdades com foco sobre aspectos biológicos.

Por fim, embora desigualdades de gênero em alcançar as recomendações de atividade física tenham sido previamente apresentadas,[28,29,41] até onde se pôde verificar, não há estudos globais utilizando o critério de pouca ou nenhuma AFMV para os mesmos fins. Assim, analisar as possíveis desigualdades a partir do critério de pouca ou nenhuma AFMV pode ampliar a perspectiva da área para um olhar mais próximo do acesso/oportunidades, sendo útil para direcionar ações com o intuito de promover equidade.

Desigualdades econômicas e étnico-raciais em atividade física: desafios a serem superados em estudos com múltiplos países

Como abordado no tópico anterior, iniquidades são definidas como diferenças injustas, desnecessárias e evitáveis, podendo ser aplicadas a diferentes tipos de relações de poder existentes em uma sociedade. Em atividade física, dentre as desigualdades sociais estudadas, também podem ser destacadas aquelas de âmbito socioeconômico (muitas vezes investigadas por meio de questões relacionadas a escolaridade ou renda *per capita*) e étnico-racial. É válido ressaltar que informações étnico-raciais não são derivadas de conceitos "prontos", mas moldados a partir de uma construção sócio-histórica, apresentando assim variações entre países.[48] Por exemplo, no Brasil, enquanto o Instituto Brasileiro de Geografia e Estatística utiliza "raça/cor",[48] usando as categorias "Amarelo", "Branco", "Indígena", "Pardo" e "Preto", o censo estadunidense usa o termo "raça e etnia", considerando as categorias "*American Indian or Alaska Native*", "*Asian, Native Hawaiian or Other Pacific Islander*", "*Black or African American*" e "*White*".[49]

Investigações realizadas com adultos têm reportado diferenças socioeconômicas em atividade física, com a prática de atividade física de lazer sendo mais frequente entre aqueles com maior grau de escolaridade, enquanto a atividade física ocupacional tem sido mais frequente entre aqueles com menor grau de escolaridade.[50] Tendências similares foram observadas entre adolescentes, onde houve maior frequência de atividade física de lazer entre grupos mais favorecidos socialmente[51] e maior atividade física de transporte entre adolescentes menos favorecidos socialmente.[52,53] A respeito das iniquidades étnico-raciais, um estudo conduzido com adultos brasileiros revelou que, entre os anos de 2006 e 2019, pessoas pretas e pardas reportaram constantemente menor prática de atividade física no lazer do que pessoas brancas.[54]

Iniquidades em atividade física podem ser explicadas por questões históricas, como processo de colonização e escravidão, as quais moldaram a própria organização social dos países, bem como seus sistemas de privilégio-opressão.[55] No Brasil, país marcado por ambos os processos de colonização e escravidão, bem como perpetuação das desigualdades por meio de adequação às novas demandas do meio de produção vigente,[56] foram identificadas profundas desigualdades na renda *per capita*, onde, no ano de 2022, pessoas brancas ganhavam, em média, 64,2% a mais do que pessoas negras.[57] Além disso, também foram observadas desigualdades em relação a condições de moradia (segundo o Censo de 2022, embora o percentual da população negra tenha sido de 55,5%, estes representaram 72,9% daqueles vivendo em favelas e comunidades urbanas)[58] e educação (conforme o Censo de 2022, o percentual de alfabetização entre negros e brancos é de 90,5% e 95,6%, respectivamente).[58]

É válido ressaltar que atividade física apresenta uma complexa cadeia de correlatos/determinantes, a qual envolve, dentre outras coisas, fatores ambientais (p.ex: disponibilidade e qualidade de estruturas para a prática de atividade física) e socioeconômicos (o que pode limitar o acesso a locais privados para a prática de atividade física). Por conseguinte, mesmo entre indivíduos em idade escolar, onde se poderia levantar hipóteses a respeito de uma distribuição mais igualitária de facilitadores de atividade física, os achados também não têm sido favoráveis. Nesse sentido, sabe-se que o ambiente escolar é importante não apenas para promover atividade física de intensidade moderada-vigorosa, mas de acesso ao conhecimento sistematizado sobre componentes da cultura corporal (p.ex: dança, luta, esporte, ginástica e jogos). No entanto, achados do Censo Escolar de 2021 revelaram que a disponibilidade de locais para a prática de atividade (p.ex: pátio, quadra e parque infantil) é menor quando o percentual de matrícula de escolares negros aumenta.[59]

Portanto, tendo em vista a existência de iniquidades socioeconômicas e étnico-raciais, é inadiável a coleta sistemática de informações por meio de inquéritos nacionais, bem como a análise e discussão destas como forma de orientar a formulação de políticas públicas com fins de erradicação das desigualdades sociais. No entanto, mesmo que discussões sobre desigualdades socioeconômicas e étnico-raciais sejam inadiáveis, uma análise ampla envolvendo países de múltiplos continentes constitui uma tarefa desafiadora.

Atualmente, o GSHS e o HBSC se apresentam dentre os principais inquéritos reunindo informações sobre atividade física de adolescentes. Embora o HBSC apresente uma escala de riqueza familiar, o GSHS não coleta informações sociodemográficas. Além disso, nenhum dos *surveys* citados avalia dimensões étnico-raciais nos seus questionários. Assim, ao mesmo tempo que se faz necessário um movimento para inserção de informações étnico-raciais – como forma de não invisibilizar desigualdades existentes - também é necessário que outros esforços sejam realizados para compreender os cenários atuais. Por exemplo: a) revisões de literatura podem ser conduzidas com o intuito de sintetizar o conhecimento disponível sobre desigualdades socioeconômicas e étnico-raciais em atividade física entre adolescentes;[60] b) Mesmo considerando a ausência de informações no HBSC e no GSHS, outras pesquisas nacionais apresentam essas dimensões (socioeconômicas e étnico-raciais), como é o caso do Brasil (PeNSE) e da Colômbia (ENSE), sendo possível delinear um estudo que objetive reunir, harmonizar e analisar essas informações. Embora discussões metodológicas acerca do processo de harmonização de variáveis socioeconômicas e étnico-raciais estejam além do escopo desta tese, esses esforços poderiam apresentar um contexto de distribuição dessas desigualdades em diferentes países.

Desafios para a análise de diferentes domínios da atividade física entre adolescentes em estudos envolvendo múltiplos países

Investigações em atividade física têm realizado a classificação deste comportamento a partir da perspectiva de quatro domínios, sendo eles transporte/deslocamento, lazer, ocupacional e doméstico.[4] Para indivíduos em idade escolar, o domínio ocupacional tende a ser substituído por atividades realizadas durante o período em que os indivíduos estão na escola.

Ao menos entre adultos, grupo populacional mais estudado, os domínios da atividade física parecem se associar de maneiras distintas com desfechos em saúde.

Por exemplo, enquanto as atividades de lazer vêm apresentando consistentes papéis de proteção contra transtornos mentais,[61] diferentes tipos de câncer,[62] e desfechos cardiovasculares,[63] benefícios à saúde provenientes de atividades laborais não são claros - essa discussão encontra-se na literatura sob o termo “paradoxo da atividade física”.[64–66] Desse modo, tratar os diferentes domínios da atividade física como equivalentes pode não ser a forma mais adequada de investigar este fenômeno. Embora o paradoxo da atividade física, *per se*, pareça suficiente para sugerir o emprego de uma avaliação da atividade física que contemple a análise dos diferentes domínios de maneira não agregada, a perspectiva de vigilância global – ou ao menos incluindo múltiplos países – pode inserir maior complexidade nesta discussão.

Considerando a impossibilidade de harmonizar informações a respeito da prática de atividade física conforme domínios entre adolescentes (devido às limitações metodológicas dos inquéritos), torna-se necessário recorrer a estudos realizados com adultos para se obter *insights* sobre essa estratificação. Dessa forma, Strain et al.[67] identificaram uma maior contribuição do domínio do lazer para a AFMV entre pessoas vivendo no Norte Global. Por outro lado, adultos vivendo no Sul Global encontram as maiores contribuições para o acúmulo semanal de atividade física naquelas que são realizadas por obrigação, tais como atividades ocupacionais e domésticas. Assim, quando as delimitações dos domínios não estão claras, estimativas agrupadas poderiam gerar vieses biológicos (ao tornar os efeitos da atividade física homogêneos entre os domínios) e relacionados à composição do indicador agregado de atividade física, o qual não considera que diferentes populações experienciam diferentes contribuições de atividades físicas realizadas por “escolha” e por “necessidade”.[68,69]

O uso de um indicador agregado para classificação dos indivíduos está de acordo com a definição clássica de atividade física apresentada por Caspersen et al.[19] e, consequentemente, com as recomendações internacionais, as quais, até 2020 (ano dos *guidelines* mais recentes em relação à confecção da presente tese), não faziam distinção entre domínios da atividade física.[16] No entanto, recomendações e vigilância a partir de uma perspectiva unicamente biológica podem se afastar da contextualização e das escolhas do indivíduo em relação ao tipo de atividade física que está sendo praticada. Nesse sentido, uma recente discussão levantada por Piggin[70] buscou superar a definição clássica de atividade física, sugerindo o entendimento deste comportamento como aquele que “envolve pessoas se movendo e atuando em espaços e contextos culturalmente específicos, influenciados por uma gama única de interesses, emoções, ideais, instruções e relacionamentos”. Desse modo, o domínio do lazer se destacar em

relação aos demais tanto a partir de uma perspectiva de benefícios à saúde quanto de escolhas dos indivíduos.

Embora alguns inquéritos populacionais conduzidos entre adolescentes, como a PeNSE (Brasil),[31] mensure tanto a atividade física global quanto o tempo despendido em diferentes domínios, outros *surveys* importantes, como o GSHS, avaliam a atividade física a partir das perspectivas de frequência semanal de deslocamento ativo para/da escola, frequência semanal de aulas de Educação Física e uma pergunta sobre atividade física global, sendo esta última utilizada para identificar aqueles que alcançam as recomendações internacionais de atividade física. O uso da questão sobre atividade física global, embora classifique os adolescentes como ativos/inativos, não consegue capturar os domínios nem as características das atividades realizadas. Assim, mesmo considerando a utilização de exemplos de atividades físicas (p.ex: futebol, vôlei, ir caminhado para a escola), não é possível distinguir a contribuição dos domínios para o acúmulo semanal, o que recai sobre as questões discutidas anteriormente a respeito das implicações biológicas e do poder de escolha dos indivíduos.

Outro ponto passível de aprofundamento está relacionado aos tipos de atividades realizadas. Mesmo considerando as atividades com maior poder de decisão por parte dos indivíduos, adolescentes poderiam estar engajados em diferentes atividades, como aquelas relacionadas ao esporte competitivo, esporte social e brincadeiras ativas.[31] Além disso, adolescentes em idade escolar também podem ter aulas de Educação Física como componente curricular (obrigatório ou não). Desse modo, a coleta de informação sobre os tipos de atividades físicas poderia ser útil para análise da distribuição dessas atividades, bem como as suas relações com diferentes desfechos.

Portanto, além dos avanços acerca da compreensão do fenômeno “atividade física”, esforços são necessários para transferir esses avanços para estratégias de vigilância, o que pode ser visualizado, por exemplo, a partir da coleta e análise sistemática de informações sobre os domínios da atividade física, sua prática enquanto escolha ou necessidade, bem como características em relação aos tipos de atividade física praticados. Assim, ao mesmo tempo em que a presente tese se debruça na análise da atividade física mensurada por meio de uma questão global (a qual não distingue domínios), também se destaca as limitações dessa abordagem – embora, atualmente, seja o único meio possível para um estudo com objetivos similares.

Indicadores macroeconômicos, sociais e atividade física

A prática de atividade física entre adolescentes pode ocorrer em diferentes momentos do dia, como no deslocamento para a escola, período escolar (incluindo aulas de Educação Física), e nos momentos de lazer. Por trás da participação dos indivíduos em atividades físicas, podemos observar a uma cadeia de fatores envolvendo determinantes individuais, intrapessoais, ambientais e globais.[71] Em investigações abordando diferentes países, um interesse geralmente observado é o de identificar se indicadores macroeconômicos e sociais poderiam estar associados à prática de atividade física.[72] Ou seja, as diferenças observadas nas prevalências de atividade física entre os países poderiam ser um reflexo de características como o desenvolvimento humano, renda *per capita* e desigualdades sociais?

Ao consultar a literatura, percebe-se que distintas métricas têm sido utilizadas para investigar a associação entre as características macroeconômicas dos países e a prática de atividade física e/ou desigualdades sociais em atividade física. Por exemplo, o Índice de Desenvolvimento Humano (IDH), baseado na expectativa de vida ao nascer, escolaridade e renda *per capita* da população, pode fornecer *insights* sobre como o desenvolvimento de um país poderia estar por trás da prática de atividade física.[73] Outros importantes indicadores que têm sido explorados são o coeficiente GINI e o *Gender Inequality Index* (GII). O GII é um índice que busca representar a desigualdade de gênero em uma população a partir de dimensões relacionadas à saúde reprodutiva, empoderamento e participação no mercado de trabalho, com a adoção deste índice podendo ampliar a compreensão de como normas de gênero poderiam estar associadas à prática de atividade física.[74] Já o coeficiente GINI é comumente utilizado para representar a como a distribuição de renda em uma determinada população se desvia de uma distribuição igualitária, podendo fornecer *insights* sobre como as desigualdades observados em um país poderia estar associada à prática de atividade física.[75]

Embora estudos prévios tenham sido conduzidos com o intuito de investigar a associação entre características macroeconômicas e a prática de atividade física entre adolescentes, investigações subsequentes ainda são necessárias para avanço do conhecimento atual. Por exemplo, usando dados da Global Matrix 4.0, Silva et al.[73] exploraram a associação entre IDH e diferentes indicadores de atividade física entre crianças e adolescentes (ex: atividade física global, atividade física estruturada e deslocamento ativo), no entanto, apenas quatro dos 57 países investigados foram de baixa e média renda. Ademais, Ricardo et al.[76] e de Looze et al.[74] exploraram associações entre o GII e desigualdades de gênero entre adolescentes, encontrando resultados em direções opostas, com menores GII indicando maiores desigualdades de

gênero no Sul Global, enquanto menores GII indicaram menores desigualdades em atividade física no Norte Global. Possíveis explicações podem estar relacionadas a origem dos microdados analisados, com Ricardo et al.[76] utilizando aqueles provenientes do Sul Global, enquanto de Looze et al.[74] utilizaram microdados provenientes do Norte Global. Assim, harmonizar e analisar inquéritos disponíveis globalmente poderia ser útil para oferecer evidências adicionais sobre as associações. Por fim, até onde pôde-se investigar, os estudos prévios não classificaram a atividade física a partir do critério de pouca ou nenhuma atividade física, o que, como discutido anteriormente, o que pode limitar a compreensão a respeito daqueles que mais precisam.

2. Objetivos

Geral

Investigar a prevalência global de pouca ou nenhuma atividade física entre adolescentes, possíveis desigualdades de gênero e associações com indicadores macroeconômicos e sociais.

Específicos

Sistematizar o uso do critério de “pouca ou nenhuma atividade física” como uma abordagem complementar para a vigilância em atividade física;

Estimar a prevalência global e possíveis desigualdades de gênero em atividade física entre adolescentes, partindo de uma perspectiva de pouca ou nenhuma atividade física;

Analisar a associação entre indicadores macroeconômicos e sociais, prevalência e desigualdades de gênero em atividade física entre adolescentes.

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3. Metodologia

Delineamento

O presente estudo utiliza dados de inquéritos nacionais de diferentes regiões do mundo, adotando o delineamento transversal nos dois primeiros artigos e uma abordagem ecológica no terceiro artigo. Como o artigo 1 teve o intuito de descrever o racional para o uso do critério de pouca ou nenhuma atividade física em estudos de vigilância, a presente metodologia terá como foco a descrição da amostra investigada nos artigos 2 e 3.

Amostra

Foram utilizados dados secundários provenientes de inquéritos conduzidos com adolescentes. Para a confecção do artigo um, além de informações sobre adolescentes, dados da Pesquisa Nacional de Saúde também foram utilizados para análises de desigualdades sociais em atividade física entre adultos brasileiros.

Inicialmente, foram utilizados dados do GSHS e do HBSC. Tanto o GSHS quanto o HBSC são pesquisas escolares conduzidas em nível nacional ou subnacional, que coletam informações por questionários autorrelatados. Buscas através de revisão de literatura e redes de contato pessoais foram realizadas com o intuito de incluir informações para países sem dados do GSHS e do HBSC. Os critérios de inclusão foram inquéritos com 1) representatividade nacional ou subnacional de adolescentes escolares ou não escolares e 2) com dados válidos sobre a atividade física, avaliada por meio de uma questão a respeito do número de dias ativos, pelo menos 60 minutos por dia, nos últimos sete dias. Para os países com dois inquéritos ou mais, foram considerados apenas o mais recente.

Tendo em vista a atualização dos microdados entre os artigos dois e três, bem como a adição de critérios de exclusão relacionados às variáveis macroeconômicas (estudo três), um *flowchart* simplificado do processo de inclusão dos inquéritos para ambos os artigos pode ser visto na Figura 2, com mais detalhes disponíveis em cada um dos respectivos artigos. Por conseguinte, a maior parte dos inquéritos utilizados foram de base escolar, com amostragem em dois ou três estágios e com acesso aberto aos microdados Quadro 1.

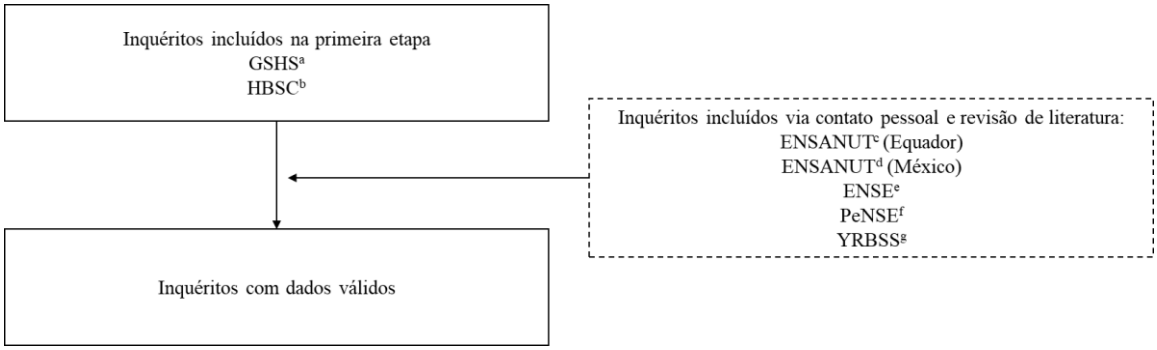

Figura 3 - Flowchart simplificado. Note: [a]Global School-based Student Health Survey; [b]Health Behaviour among School-aged Children; [c]Encuesta Nacional de Salud y Nutrición (Equador); [d]Encuesta Nacional de Salud y Nutrición (Mexico); [e]Encuesta Nacional de Salud Escolar; [f]Pesquisa Nacional de Saúde do Escolar; [g]Youth Risk Behavior Surveillance System.

Quadro 1 - Detalhes sobre a amostragem e acesso aos inquéritos.

Inquérito	Amostragem	Acesso aos inquéritos
Global School Health Survey (GSHS)	Inquérito de base escolar, com processo de amostragem realizado em dois estágios	Acesso aberto: https://extranet.who.int/ncdsmicrodata/index.php/catalog/gshs/?page=1&ps=15&repo=GSHS
Health Behaviour in School-aged Children (HBSC)	Inquérito de base escolar, com processo de amostragem realizado em dois estágios	Mediante solicitação formal: https://hbsc.org/
Youth Risk Behavior Surveillance System (YRBSS)	Inquérito de base escolar, com processo de amostragem realizado em dois estágios	Mediante solicitação formal: https://www.cdc.gov/yrbs/index.html
Pesquisa Nacional de Saúde do Escolar (PeNSE), Brasil	Inquérito de base escolar, com processo de amostragem realizado em dois estágios em cidades capitais e em três estágios em cidades não-capitais	Acesso aberto: https://www.ibge.gov.br/estatisticas/sociais/populacao/9134-pesquisa-nacional-de-saude-do-escolar.html
Encuesta Nacional de Salud Escolar (ENSE), Colômbia	Inquérito de base escolar, com processo de amostragem realizado em três estágios	Mediante solicitação formal ao *Ministerio de Salud y Protección Social*.
Encuesta Nacional de Salud y Nutrición (ENSANUT), Equador	Inquérito domiciliar com processo de amostragem realizado em três estágios	Acesso aberto: https://www.ecuadorencifras.gob.ec/salud-salud-reproductiva-y-nutricion/
Encuesta Nacional de Salud y Nutrición (ENSANUT), México	Inquérito domiciliar com processo de amostragem realizado em três estágios	Acesso aberto: https://ensanut.insp.mx/encuestas/ensanut2016/index.php

Correlatos

Gênero

Os inquéritos utilizados no presente estudo coletaram informações sobre sexo a partir de diferentes questões, como “qual é o seu sexo?”, sendo as opções de resposta “masculino ou feminino” e “você é menino ou menina?”, com opções de resposta “menino ou menina”. Ao logo da presente tese, a variável “sexo” foi tratada como “gênero”. Essa decisão foi tomada uma vez que as desigualdades em atividade física entre meninos e meninas parecem ser mais bem explicadas por aspectos sociais do que biológicos.[1,2]

Idade

Enquanto o HBSC utilizou perguntas sobre mês e ano de nascimento para o cálculo da idade, os outros inquéritos tiveram questões perguntando a idade diretamente, com diferentes opções de resposta variando de ≤11 a ≥19 anos.

Indicadores macroeconômicos e sociais

O IDH busca apresentar o desenvolvimento de um país por meio de um índice que enfatiza as capacidades das pessoas. Assim, o IDH é calculado a partir de três dimensões: a) dimensão da longevidade, composta pela expectativa de vida ao nascer; b) dimensão da educação, composta pelos anos esperados de escolaridade e a média de anos de escolaridade; c) dimensão da renda, composto pela renda *per capita*. O índice varia de 0 a 1, com valores mais altos representando maior desenvolvimento. Para o presente estudo, as informações sobre IDH foram coletadas no *website* das Nações Unidas (https://hdr.undp.org/).

O GII é um índice que tem o intuito de apresentar desigualdades de gênero, sendo calculado a partir de três dimensões: a) saúde reprodutiva (razão de mortalidade materna e taxa de natalidade de adolescentes), empoderamento (percentual de mulheres e homens com pelo menos educação secundária, percentual de homens e mulheres com assentos parlamentares) e atividade econômica (taxas de participação feminina e masculina na força de trabalho). O GII varia de 0 a 1, e os valores mais altos apresentam as maiores desigualdades. O GII foi coletado no *website* das Nações Unidas (https://hdr.undp.org/).

O índice GINI busca apresentar, por meio de uma escala de 0 a 1, a extensão em que a distribuição de renda dentro de uma economia se desvia de uma distribuição perfeitamente igual. O GINI varia de 0 a 1, com valores mais elevados representando uma distribuição mais desigual. O GINI foi coletado do *website* do Banco Mundial (https://data.worldbank.org/).

Desfecho

Atividade física

Com exceção do Equador e do México (para adolescentes com idade entre 15 e 19 anos), todos os inquéritos analisados avaliaram a prática de atividade física por meio da pergunta “Nos últimos sete dias, em quantos dias você fez atividade física por pelo menos 60 minutos (1 hora) por dia?”, com possíveis respostas variando de zero a sete dias. Na presente tese, dois critérios foram utilizados para analisar prevalências e desigualdades em atividade física. O primeiro foi adotado com o intuito de identificar aqueles que fazem alguma atividade física (critério discutido no artigo 1), sem se preocupar com o cumprimento dos *guidelines*. O segundo critério teve o intuito de identificar aqueles que alcançam as recomendações de atividade física, sendo ao menos 60 minutos diários de AFMV nos últimos sete dias.

O Quadro 2 apresenta as perguntas utilizadas em cada um dos inquéritos, bem como a dicotomização adotada nos artigos. É possível observar que a ENSANUT (Equador) não contabilizou o tempo ativo durante as aulas de Educação Física. No México, para adolescentes acima de 14 anos, o tempo comumente gasto em atividade física moderada e vigorosa em um dia nos últimos sete dias foi reportado separadamente. Assim, assumindo que as respostas eram referentes ao mesmo dia, esses valores foram somados, sendo aplicado o ponto de corte de ≥60 minutos de AFMV em um ou mais dias por semana. No estudo 3, os microdados do México não foram utilizados. Embora as propriedades psicométricas das questões utilizadas não tenham sido investigadas globalmente, um estudo prévio observou valores moderados de correlação entre dias com ≥60 minutos de AFMV e AFMV mensurada por acelerômetro.[3]

Análise estatística

A estatística descritiva foi realizada por meio de frequências absolutas, relativas e seus respectivos intervalos de confiança de 95%. Inicialmente, peso amostral foi utilizado para obter a prevalência de atividade física em casa país. Posteriormente, as estimativas agrupadas foram obtidas por meio do comando “metaprop. Modelos de regressão de Poisson foram utilizados para identificar as diferenças de gênero na prática de atividade física, com as Razões de Prevalência agrupadas sendo obtidas por meio de modelos de meta-análise de efeitos randômicos, utilizando o comando “metan”. Para identificar a correlação entre indicadores macroeconômicos e a prática de atividade física, empregou-se a correlação de Spearman. Os resultados foram estratificados por região, conforme a classificação do Banco Mundial. Todas as análises froam conduzidas utilizando o Stata, versões 15.0 e 18.0 (StataCorp., College Station, TX, US.

Quadro 2 - Procedimento utilizado para categorização da atividade física.

Inquérito (país)	Pergunta	Opções de resposta	Dicotomização
GSHS[a]; HBSC[b]; YRBSS[c]; ENSE[d] (Colômbia); ENSANUT[e] (México)	"Nos últimos sete dias, em quantos dias você fez atividade física por pelo menos 60 minutos (1 hora) por dia?"	a) 0 dia; b) 1 dia; c) 2 dias; d) 3 dias; e) 4 dias; f) 5 dias; g) 6 dias; h) 7 dias.	Critério 1: 0 dia: pouca ou nenhuma AFMV; ≥1 dia: ≥60 minutos de AFMV um ou mais dias por semana. Critério 2: ≤6 dias: não atinge às recomendações; 7 dias: atinge às recomendações.
PeNSE[f] (Brasil)	"Nos últimos sete dias, em quantos dias você fez atividade física por pelo menos 60 minutos (1 hora) por dia?"	a) Nenhum dia nos últimos 7 dias (0 dia); b) 1 dia nos últimos 7 dias; c) 2 dias nos últimos 7 dias; d) 3 dias nos últimos 7 dias; e) 4 dias nos últimos 7 dias; f) 5 dias nos últimos 7 dias; g) 5 dias mais sábado, nos últimos 7 dias; h) 5 dias mais sábado e domingo, nos últimos 7 dias.	Critério 1: 0 dia: pouca ou nenhuma AFMV; ≥1 dia: ≥60 minutos de AFMV um ou mais dias por semana. Critério 2: ≤6 dias: não atinge às recomendações; 7 dias: atinge às recomendações.
ENSANUT[g] (Equador)	"Nos últimos sete dias, em quantos dias você fez atividade física por pelo menos 60 minutos (1 hora) por dia?" (excluir aulas de educação física na escola).	As respostas poderiam variar de 0 a 7 dias.	Critério 1: 0 dia: pouca ou nenhuma AFMV; ≥1 dia: ≥60 minutos de AFMV um ou mais dias por semana. Critério 2: ≤6 dias: não atinge às recomendações; 7 dias: atinge às recomendações.
ENSANUT[g] (México)	Para participantes acima de 14 anos:	-	Critério 1:

	O tempo gasto em atividade física moderada e vigorosa em 1 dia nos 7 dias anteriores foi relatado separadamente. Em seguida, o tempo gasto em cada intensidade de atividade física foi somado, assumindo que se referiam ao mesmo dia.		Os participantes que realizaram ≥60 minutos de AFMV foram classificados como tendo ≥60 minutos de AFMV em um ou mais dias por semana. Critério 2: A presente tese não fez o uso das recomendações para a análise dos dados da ENSANUT (México).

Nota: [a]*Global School-based Student Health Survey*; [b]*Health Behaviour among School-aged Children*; [c]*Youth Risk Behavior Surveillance System*.[d]*Encuesta Nacional de Salud Escolar*. [e]*Encuesta Nacional de Salud y Nutrición* – México. [f]Pesquisa Nacional de Saúde do Escolar. [g]Encuesta Nacional de Salud y Nutrición – Ecuador.

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4. Resultados

Artigo 1

No or Low Moderate-to-Vigorous Physical Activity: Focusing on the Least Active as an Additional Approach for Physical Activity Surveillance

Raphael H. O. Araujo, André O. Werneck, R. Glenn Weaver, Rafael M. Tassitano, Célia L. Szwarcwald, Gilmar M. Jesus, Deborah C. Malta, Javier Brazo-Sayavera Grégore I. Mielke, Mark S. Tremblay, Danilo R. P. Silva

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Background

Physical activity (PA) is a well-established protective factor for several negative health outcomes, which include aspects related to physical, mental, and social health, and have been reported among different subgroups.[1] Accordingly, guidelines have been developed to inform different population subgroups (e.g., children, adolescents, and adults) on an adequate amount of PA for health benefits.[1] For instance, 2020 WHO guidelines recommend that adults achieve at least 150 minutes per week of moderate-intensity PA or at least 75 minutes of vigorous-intensity PA per week, or an equivalent combination of moderate to vigorous PA (MVPA).[1] For children and adolescents (5-17y), WHO guidelines recommend a daily average of 60 minutes of MVPA.[1] Studies have sought to identify the global prevalence across the lifespan who achieve these guidelines and alarmingly found the prevalence of not meeting the WHO guidelines was 27.5% among adults and 81.0% among adolescents.[2,3] Although the information from these publications is useful to identify those meeting and not meeting desired targets, it provides no insight on those with no or low MVPA.

Previous studies have demonstrated that the association between MVPA and health outcomes tends to be curvilinear, with important increasing benefits of more MVPA among those who have no or low MVPA.[4–6] For instance, in a cohort with 416,175 adults ≥20 years (mean follow-up of 8.05 [4.21] y), Wen et al.[7] observed that when compared to the inactive group (<3.75 MET-h/week), those with low-volume leisure-time PA (3.75-7.49 MET-h/week, average of 15 min/day) reduced their risk of mortality by 14%, followed by a reduction of 4% for each additional 15 min/day, until reaching a plateau around 100 min/day (interactions were not observed between the covariates used, such as age). Similarly, studies with adolescents showed that when compared to

accumulating 0 to 14 min/day of MVPA, reaching at least 15 to 29, 30 to 59, and ≥60 min/day of MVPA reduced the probability of low HDL and elevated triglycerides;[8] and, when compared to no MVPA, there was observed a reduction of 50 and 63% in the probability for hypertension at 30 and 60 min/day of MVPA, respectively.[9] Also, McMahon et al.[10] found that compared to those who reported 0 to 3 days of at least 60 min/day of MVPA during the past two weeks, adolescents who reported 4 to 7 and 8 to 14 days presented lower depression and anxiety scores, as well as higher scores of well-being. Therefore, increasing MVPA for those with no or low MVPA is an important issue that deserves attention from a population-level point of view, and using only the official guidelines to code the participants as active/inactive could hide significant information concerning population PA levels.

In addition, there may be important differences between groups in the prevalence of practicing some MVPA even when there are no differences between these same groups in the prevalence of PA guideline achievement. To illustrate this, we used data from the Global School-based Student Health Survey (GSHS) from Latin American & Caribbean countries (Table 1).[11] We observed that the prevalence of meeting PA guidelines among adolescents was similar in Argentina, Bahamas, and Barbados (16.5%, 15.1%, and 18.6%, respectively); however, when we look at the prevalence of those with no or low MVPA (zero days/week with at least 60 min/day of MVPA), a greater difference is noticed (17.2% in Argentina, 31.8% in the Bahamas, and 29.9% in Barbados). Thus, it is plausible that despite a similar percentage of those who meet PA guidelines, Argentina might provide better opportunities and access for youth PA than the Bahamas and Barbados.

The use of different thresholds to monitor PA could also influence interpretations of related correlates. For instance, beyond the use of PA guidelines as a cut-off in PA surveillance, a country interested in using an additional cut-off to identify those with no or low MVPA could find four possible scenarios. Figure 1 presents an example of possible scenarios considering differences in PA levels between boys and girls, each providing different information for action(s). Cell A presents the worst scenario, where the difference occurs in both guideline adherence and no or low MVPA. This scenario indicates that a subgroup is more universally struggling with achieving adequate MVPA. Cell B presents a scenario where there is no difference in the prevalence of guideline adherence, but there is a difference between subgroups with no or low MVPA. This scenario indicates that although reaching the recommendations could happen similarly among the subgroups, other inequalities appear at the low end of MVPA that may signal differences in access/opportunities to PA or failure in influencing the least active groups

with the current strategies. Cell C presents a scenario where there is a difference in guideline adherence but not for those with no or low MVPA, which could indicate that the subgroups have similar access/opportunities to PA practice, such as in cases of a larger coverage of PA for the entire population, but that the overall impetus for PA falls short of meeting the guidelines. Last, cell D presents a more equitable scenario, where there is no difference in any threshold used, suggesting broader equality of access and opportunity. In any scenario, the same correlate may present different associations according to the cut-off used and, consequently, result in different interpretations and resultant strategies.

Finally, although there were investigations already employing an approach to identify those with lower PA levels,[12,13] studies on the prevalence and/or correlates of PA have focused on those who meet the PA guidelines.[2,3,14] Thus, we seek to initiate a discussion on the use of "no or low MVPA" as a complementary approach to PA surveillance, in line with the premise of the 2020 WHO physical activity and sedentary behavior guidelines, which highlight that health benefits can be obtained even with accumulations of physical activity below the recommendations. However, it is important to consider that the effects of PA on health can be affected by the contributions of the PA domains.[15] Therefore, we hypothesize that analyses of no or low MVPA can present a more comprehensive view of the most unfavored/disadvantaged groups concerning PA practice, adding a complementary insight to PA surveillance between and within different populations. Furthermore, countries could target and monitor not only increasing the prevalence of physical activity, but also reducing no or low MVPA, nudging towards the PA guidelines.

Concept and application

A cut-off based on no or low MVPA will code people into at least two groups, those with no or low MVPA and those with some MVPA. In operational terms, no or low MVPA should be considered as the lowest possible amount of MVPA for an assessment method, therefore this approach would not need to have a standard way of classification and interpretation. For example, among adults, several studies have used self-reported questionnaires, such as the International Physical Activity Questionnaire (IPAQ) and the Global Physical Activity Questionnaire (GPAQ).[16,17] These questionnaires assess MVPA considering the time spent in each PA domain (i.e., work, transport, household, and leisure), where overall MVPA is calculated as the sum of the time spent in each domain assessed. Both GPAQ and IPAQ ask to report activities with at least 10 minutes

continuous duration, therefore, in these cases, the no or low MVPA approach might be applied to code those who reported not having performed MVPA as no/low MVPA. Among adolescents, international surveys (e.g., GSHS, Health Behaviour in School-aged Children - HBSC) tend to assess the weekly frequency of days with at least 60 minutes of MVPA, with possible answers ranging from zero to seven days in the past week. In this case, it is not possible to identify adolescents with zero minutes of MVPA per week. However, aiming to identify those with no or low MVPA versus some MVPA, the use of a cut-off of less than one day per week of 60 min/day of MVPA might be considered.

The concept of no or low MVPA can also be applied to investigating the PA domains separately, as well as different types of PA. For instance, as both IPAQ and GPAQ use questions that allow an estimate of the time spent in MVPA during leisure-time, the approach could be used to determine the prevalence of those with no or low leisure-time PA, and help identify specific population groups that should be the target of leisure-related public policies. Furthermore, considering that PA guidelines also recommend specific activities - such as those related to muscle and bone strengthening – investigating these activities from an access/opportunity perspective could identify scenarios concerning subgroups systematically unfavored/disadvantaged (e.g., racialized communities and people with lower educational levels).[18] This could result in a call for public policies promoting types of PA that often are related to private structures (e.g., gyms). The approach based on no or low MVPA could also indicate that without reducing social inequality, physical inactivity reduction would be more difficult to achieve.

Given that many countries assess PA in their national health surveys using methodologies that can be harmonized, the no or low MVPA approach could also be used as an additional approach in global PA surveillance. For instance, for adults, the STEPS (STEPwise approach to non-communicable diseases risk factor surveillance) uses GPAQ to assess information on PA. Data from STEPS were previously used to estimate the global prevalence of PA and are available from the WHO website by formal request.[19] For adolescents, both GSHS and HBSC (nationally representative school-based health surveys) assess PA among adolescents by the use of a question about the number of days per week with at least 60 min/day of MVPA. Similar to STEPS, these data were used for estimating PA among adolescents and data are available on their respective websites.[19,20]

Although global PA surveillance has been carried out predominantly by self-report questionnaires, it is important to highlight that the no or low MVPA approach could

be also applied with device-based methods, such as accelerometers. However, considering that zero minutes of MVPA per week would be very rare, specific procedures should be developed to identify thresholds for low MVPA, which could be done, for example, from the distribution of PA in specific populations and through the combination with self-report methods to identify the domains and types of PA.

Advantages of no or low MVPA approach in the investigation of social inequalities

Although several studies have reported inequalities in PA, such as between gender and socioeconomic status, when research reports that men are more active than women or that those with higher socioeconomic levels are more active than those with lower socioeconomic levels in leisure-time PA, the results tend to reflect the relative or absolute difference based on the prevalence of those who reach/do not reach the PA guidelines. Using only this threshold can hide important information at the root of inequalities, as people with higher social vulnerability tend to have less access to PA lessons and facilities. Therefore, the inequalities can be even higher when thresholds are more sensitive to identifying those with no or low MVPA, especially for domains such as leisure-time.

Using data from the Brazilian National Health Survey for adults (≥18 to 64 years old), we illustrated a situation of inequalities that can be hidden when only the threshold of 150 min/week of leisure-time PA is used. Table 2 shows the prevalence of adults with no or low MVPA and those who fail to achieve at least 150 min/week of leisure-time PA according to race/color and educational level. We observed that, compared to Black and Brown people, White people had a lower prevalence of no or low MVPA and <150 min/week of LTPA. However, larger differences between Black and Brown people and White people were observed when no or low leisure-time PA was the outcome. When examined by educational level, we observed that those with no formal education were less likely to achieve the PA guidelines than their peers at higher educational levels, with a larger difference compared to those with complete college or more (32.6 percentage points). Similar to findings for race/color, we observed greater differences when no or low MVPA was used (44.2 percentage points). The difference in no or low MVPA could be worse than the difference in achieving the PA guidelines and may be a more sensitive indicator of access/opportunities to PA practice. Differences in achieving at least 150 min/week of PA during leisure-time can reflect alternate differences that occur in the access/opportunities to be active. Thus, studies might consider using both thresholds to

identify what is behind inequalities in access/opportunities to PA practice as well as proposing ways to overcome them.

In contrast, other possible scenarios could show a large difference in the prevalence of meeting the PA guidelines but with little or no difference in no or low MVPA. For instance, using data from HBSC from Canadian adolescents, we observed that boys and girls present a similar prevalence of less than one day/week with 60 min/day or more of MVPA (boys: 3.8% versus girls: 4.9%), while greater differences were noticed in failing to achieve the PA guidelines (boys: 71.3% versus girls: 83.0%). This example would indicate a large general coverage of MVPA opportunities for both boys and girls, and the focus of health policies should be on promoting a higher amount of MVPA for those who have access to PA opportunities but are not achieving the international guidelines (i.e., girls).

Limitations

Despite the advantages of using no or low MVPA as an additional way of PA surveillance, some limitations need to be considered. First, some population subgroups could present no or low MVPA due to medical restrictions. In this case, to do some MVPA could be not a question of choice or access/opportunities. Second, in countries with a high prevalence of some PA (e.g., >90%), this approach would suffer from a ceiling effect. Thus, additional research about other approaches that seek to identify those less favored based on the specific countries' MVPA frequency and distribution could be welcome. Third, as the threshold to identify no or low MVPA is not established, the use of the lowest possible amount of MVPA could limit comparisons between different assessment methods. Fourth, although we have raised hypotheses that no or low MVPA could be explained, at least partially, by the lack of access/opportunities for PA practice, surveillance systems could benefit from including questions about perceived access to PA. Fifth, further studies could deepen the investigation on no or low MVPA seeking to analyze the role of individual determinants (e.g., motivation to PA practice), as well as to identify if these factors differ between countries/regions.

Conclusions

Facing the global burden of non-communicable chronic disease, WHO launched an action plan with the goal of reducing physical inactivity by 15% by 2030.[21] In addition, to monitor the progress of countries, several studies have sought to identify trends in PA/physical inactivity.[2,3] However, when thresholds based solely on PA guidelines are used to code the participants, small increases in PA might not be noticed. Thus, we recommend the use of no or low MVPA as an additional tool in PA surveillance, which

might help present a more comprehensive view of progress in improving the coverage of PA, especially in countries/regions with lower coverage.

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Table 1 - Prevalence of 0 and 7 Days per Week of at Least 60 Minutes per Day of MVPA Among Adolescents.

Country	Survey year	0 d/wk of at least 60 min/d of MVPA (95% CI)	7 d/wk of at least 60 min/d of MVPA (95% CI)
Anguilla	2016	27.1 (24.1; 30.5)	19.3 (16.6; 22.3)
Antigua and Barbuda	2009	30.0 (28.0; 33.8)	22.7 (20.1; 25.4)
Argentina	2018	17.2 (17.2; 18.5)	16.5 (15.9; 17.1)
Bahamas, The	2013	31.8 (28.8; 34.1)	15.1 (13.0; 17.4)
Barbados	2011	29.9 (26.9; 31.8)	18.6 (16.7; 20.8)
Belize	2011	31.7 (29.7; 33.8)	21.2 (19.4; 23.1)
Bolivia	2018	25.5 (24.5; 26.6)	11.4 (10.7; 12.2)
British Virgin Islands	2009	31.9 (28.9; 33.5)	18.0 (16.2; 20.0)
Cayman Islands	2007	22.2 (20.2; 25.0)	14.8 (12.9; 17.0)
Chile	2013	17.7 (15.7; 19.6)	13.9 (12.3; 15.7)
Costa Rica	2009	18.7 (16.7; 19.8)	18.5 (17.0; 20.0)
Curaçao	2015	32.2 (30.2; 33.9)	11.8 (10.6; 13.2)
Dominica	2009	35.7 (32.7; 37.6)	16.2 (14.4; 18.2)
Dominican Republic	2016	33.2 (30.2; 36.2)	12.6 (10.6; 14.8)
El Salvador	2013	30.6 (28.6; 33.2)	12.9 (11.4; 14.6)
Grenada	2008	38.9 (35.9; 41.4)	15.2 (13.3; 17.3)
Guatemala	2015	30.5 (27.5; 33.1)	10.6 (9.0; 12.5)
Guyana	2010	40.4 (38.4; 42.7)	15.6 (14.1; 17.2)
Honduras	2012	29.3 (27.3; 31.9)	15.7 (14.0; 17.6)
Jamaica	2017	29.9 (26.9; 31.7)	23.7 (21.5; 26.2)
Panama	2018	23.0 (22.0; 25.3)	14.8 (13.5; 16.2)
Paraguay	2017	22.7 (20.7; 23.8)	16.7 (15.4; 18.1)
Peru	2010	18.9 (16.9; 19.8)	15.3 (14.0; 16.7)
St. Kitts and Nevis	2011	32.1 (30.1; 34.8)	18.6 (16.7; 20.7)
St. Lucia	2018	29.5 (27.5; 31.9)	21.3 (19.4; 23.3)
St. Vincent and the Grenadines	2018	31.4 (29.4; 33.8)	18.5 (16.7; 20.4)
Suriname	2016	34.2 (32.2; 36.5)	19.0 (17.3; 20.8)
Trinidad and Tobago	2017	26.1 (25.1; 28.6)	20.3 (18.8; 22.0)
Uruguay	2012	20.8 (19.4; 22.2)	15.7 (14.4; 17.0)

Abbreviation: MVPA, moderate-to-vigorous physical activity. Note: Global School-based Student Health Survey from Latin American & Caribbean countries.

Table 2 - Prevalence of moderate-to-vigorous LTPA Among Brazilian adults according to race/color and educational level.

	No/low LTPA		<150 min/week	
	% (95%CI)	PR (95%CI)	% (95%CI)	PR (95%CI)
Race/color				
Black and Brown	59.4 (58.5; 60.3)	Ref	72.6 (71.8; 73.4)	Ref
White	52.2 (51.0; 53.3)	0.88 (0.85; 0.90)	68.9 (67.9; 70.0)	0.95 (0.93; 0.97)
Educational level				
No formal education	80.0 (77.3; 82.5)	Ref	87.4 (85.0; 89.4)	Ref
Less than secondary	68.3 (67.3; 69.3)	0.85 (0.82; 0.89)	80.6 (79.7; 81.4)	0.92 (0.90; 0.95)
Complete secondary	51.6 (50.4; 52.7)	0.64 (0.62; 0.67)	67.5 (66.3; 68.5)	0.77 (0.75; 0.80)
Complete college or more	35.8 (34.3; 37.4)	0.45 (0.42; 0.47)	54.8 (53.2; 56.4)	0.63 (0.60; 0.65)

Abbreviations: CI, confidence interval; LTPA, leisure-time physical activity; PR, prevalence ratio; Ref, reference. Note: Brazilian National Health Survey for adults (≥18–64 y old), 2019.

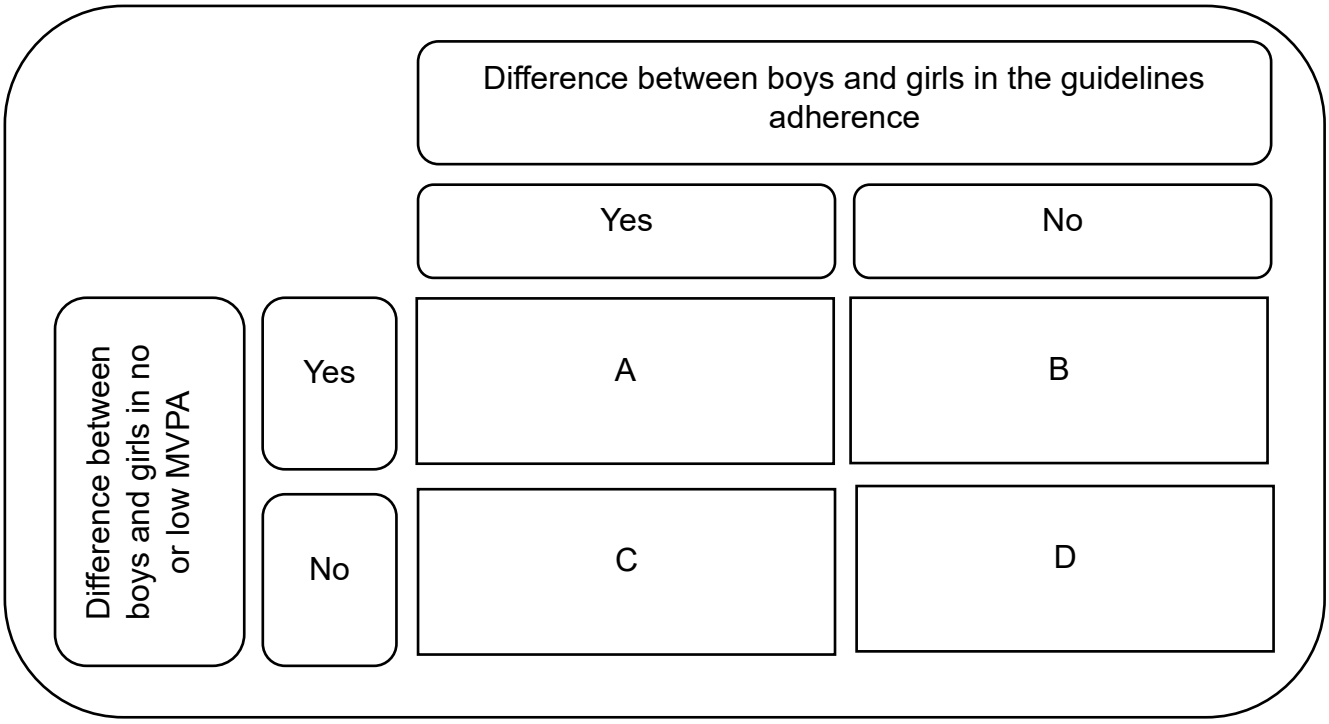

Figure 1 - Possible scenarios for analysis aiming to identify differences between boys and girls concerning “no or low MVPA” and guideline adherence. MVPA indicates moderate-to-vigorous physical activity.

Artigo 2

Global prevalence and gender inequalities in at least 60 min of self-reported moderate-to-vigorous physical activity 1 or more days per week: An analysis with 707,616 adolescents

Raphael H. O Araujo; André O. Werneck; Clarice L. Martins; Luciana L. Barboza; Rafael M. Tassitano; Nicolas Aguilar-Farias; Gilmar M. Jesus; Robinson Ramírez-Vélez; Riki Tesler; Adewale L. Oyeyemi; Ellen C. M. Silva; Robert G. Weaver; Mark S. Tremblay; Javier Brazo-Sayavera; Grégore I. Mielke; Danilo R. P. Silva

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Abstract

Background: Guidelines recommend that adolescents should accumulate an average of 60 min per day of moderate-to-vigorous physical activity (MVPA). However, using only this cut-off could hide important information. For instance, from a population-level point of view, increasing physical activity for those with no or low physical activity could provide more health benefits than increasing physical activity for those with intermediate levels. Also, including a more sensitive cut-point of at least 1 day per week could be an additional strategy for identifying those with low access/opportunities for physical activity practice. Thus, the current study aims to estimate the prevalence of ≥60 min of MVPA 1 or more days per week among adolescents globally, and to describe any relevant gender inequalities.

Methods: We used representative datasets from 146 countries/territories collected between 2003 and 2019. MVPA was self-reported. Participants were grouped into younger (≤14 years old) and older (>14 years old) adolescents. Crude Poisson regression models were used to identify the relative differences in ≥60 min of MVPA 1 or more days per week between boys and girls, and random-effects meta-analysis models were used to identify the pooled estimates. Analyses were stratified by country and region.

Results: Approximately 80% of both younger and older adolescents reported ≥60 min of MVPA 1 or more days per week. This prevalence was ≥94% in Europe & Central Asia and North America, while the estimates for the other regions were <77%. The prevalence of ≥60 min of MVPA 1 or more days per week was higher among boys than girls, with the largest differences occurring among the oldest adolescents ($PR_{\leq 14y}$: 1.04 (95% confidence interval (95%CI):1.03–1.04) *vs.* $PR_{>14y}$: 1.09 (95%CI:1.08–1.10)).

Conclusion: Approximately 8 out of 10 adolescents reported accumulating ≥60 min of MVPA at least 1 day per week, with notable differences between regions. Gender differences were observed in several countries, especially among the oldest adolescents. Priorities for physical activity promotion among adolescents should include increasing access/opportunities for physical activity among those who do not achieve ≥60 min of MVPA 1 or more days per week and reducing gender inequalities.

Keywords: Global School-based Student Health Survey; Health Behavior Among School-aged Children; Inequality; Surveillance; Youth

1. Introduction

Higher levels of physical activity have been favorably associated with children's and adolescents' physical, mental, and cognitive health.[1] In addition, physical activity tracks moderately between adolescence and adulthood[2] and reduces the risk for negative health outcomes later in life.[3,4] According to the 2020 World Health Organization (WHO) recommendations, adolescents should accumulate an average of 60 min per day of moderate-to-vigorous physical activity (MVPA).[5]

Global efforts have sought to estimate the prevalence of adolescents who meet the WHO physical activity guidelines. In 2012, using data from 105 countries/territories, Hallal et al.[6] estimated that 80.3% of adolescents did not achieve ≥60 min of MVPA per day. Similarly, in 2019, an updated estimate by Guthold et al.,[7] using data from 146 countries/territories, reported that 81.0% of adolescents were insufficiently active. Although meeting the WHO physical activity guidelines is associated with positive health outcomes, there is evidence demonstrating that levels of physical activity below the recommended level are also associated with health benefits.[4,8–11] For instance, previous studies have shown a consistent reduction in the risk of different negative health outcomes with small increases in MVPA followed by a plateau, even with suboptimal MVPA levels.[8–11] Thus, moving from little or no MVPA to some MVPA seems to have a greater impact on health than moving from an intermediate level of MVPA to guideline compliance. These results support the new approach introduced in the WHO physical activity and sedentary behavior guidelines, which is based on the premise that "every movement counts."[5]

Therefore, beyond estimating the prevalence of adolescents meeting the WHO physical activity recommendation, exploring the prevalence of ≥60 min of MVPA 1 or more days per week can also provide information to better understand the physical

activity continuum and develop strategies to promote physical activity among those who need it most. Thus, different strategies should be planned to promote any MVPA for those with 0 days/week and to improve MVPA among those who accumulate 60 min of MVPA between 1 and 6 days per week. For instance, if within a specific country 2 subgroups present a similar prevalence of physical activity but there are differences related to 1 or more days per week of ≥60 min of MVPA, these differences might indicate inequalities in access/opportunities to engage in physical activity practice and/or failure in reaching the least active groups with current strategies, which should be the priority.

Special attention is also required to assess inequalities in physical activity. Prior studies with adolescents have consistently shown that girls are less active than boys,[6,7,12] and these differences seem to occur from early childhood.[13] However, the evidence is generally based on the traditional cut-off of ≥60 min of daily MVPA, which might hide important inequalities in physical activity that are not restricted to guideline compliance, such as opportunities for being physically active. Identifying differences between boys and girls in other categories of MVPA (e.g., ≥60 min of MVPA 1 or more days per week) might further inform our understanding of gender inequalities in physical activity. Studies on ≥60 min of MVPA 1 or more days per week can contribute to strategies for reducing gender differences in adolescents' physical activity,[14] which could have a substantial impact on overall population health.[15] Thus, the current study sought to estimate the global prevalence of ≥60 min of MVPA 1 or more days per week among adolescents, as well as to analyze possible gender inequalities in ≥60 min of MVPA 1 or more days per week.

2. Methods

2.1. Study design

This cross-sectional study used different sources to pool data on adolescents from East Asia & the Pacific, Europe & Central Asia, Latin America & the Caribbean, the Middle East & North Africa, North America, South Asia, and Sub-Saharan Africa, which were collected between 2003 and 2019.

2.2. Sample

Cross-sectional data were mainly obtained from the Global School-based Student Health Survey (GSHS) and the Health Behaviour in School-aged Children (HBSC) survey. For the countries with no GSHS/HBSC data, we sought additional data sources through previous studies (non-systematic search) and personal networks. The

inclusion criteria were nationally representative surveys or surveys with a defined subnational population of countries or territories of school-going or not school-going adolescents that included a question regarding the number of days the respondent was physically active for at least 60 min per day in the past 7 days. For the countries with 2 or more surveys, only the most recent was considered. Only data from China (representative of Beijing, Hangzhou, Wuhan, and Urumqi), the UK (representative of England, Scotland, and Wales), Venezuela (representative of Barinas and Lara), and Zimbabwe (representative of Bulawayo, Harare, and Manicaland) were not nationally representative. Details on the sampling strategy for each survey included are shown in Supplementary Material A. All surveys were previously approved by local ethics committees in each country. The data were anonymized, and informed consent was obtained from the students and/or parents/legal guardians, as local ethics review boards required.

2.3. Gender and age

The GSHS used the question “What is your sex?” with possible answers “male” and “female”, while the HBSC used the question “Are you a girl or a boy?” with possible answers “boy” and “girl”. Throughout this paper, we used the term gender because most evidence points out that the difference in the practice of physical activity between boys and girls is related to a social construction (gender), not a biological one (sex).[12,16]

To gather age data using the GSHS, the question “How old are you?” was used, with possible answers ranging from ≤11 years old to ≥18 years old; for the HBSC, the questions comprised information about month and year of birth to calculate age.

2.4. Harmonization process

The surveys included in the present study had different target ages. For instance, GSHS focused on students aged 13–15 years (initial years) and 13–17 years, while the HBSC focused on students aged 11, 13, and 15 years. Considering that age is a relevant correlate of physical activity among adolescents,[17,18] analyzing different age intervals together might increase the probability of biases in our estimates. Thus, we chose not to present combined prevalence but only the age-stratified prevalence (≤14 years and >14 years). Participants with no data for exposure or outcomes were excluded. Additional details are presented in Supplementary Table 1A.

2.5. MVPA

Both GSHS and HBSC assessed MVPA by the question: “During the past 7 days, on how many days were you physically active for a total of at least 60 min per day?” Both questionnaires presented MVPA as any activity that increases heart rate and causes an individual to be out of breath some of the time. Some country-specific examples were used, such as running, biking, dancing, football, swimming, and skating. Possible answers were 0, 1, 2, 3, 4, 5, 6, or 7 days. We used the cut-off of 60 min of MVPA on at least 1 day in the past 7 days. The surveys from Brazil, Colombia, Ecuador, and Youth Risk Behavior Surveillance System (YRBSS) countries included questions similar to those used by the GSHS and HBSC, with Mexico (for participants >14 years) presenting the greatest deviation from the GSHS and HBSC questions. Details on the questions used in each survey are presented in Chart S1A.

2.6. Statistics

Descriptive statistics were computed using relative frequencies and their respective 95% confidence intervals (95%CIs). The harmonized age-stratified weighted prevalence of ≥60 min of MVPA 1 or more days per week was estimated through the command “metaprop”. Country-level prevalence of ≥60 min of MVPA 1 or more days per week was presented through maps, created using the command “grmap”. Absolute differences between boys and girls were reported in percentage points (p.p.). Crude Poisson regression models were used to identify the relative differences between boys and girls, and the Prevalence Ratios (PR) of each country were pooled through random-effects meta-analysis models, using the command “metan”. Heterogeneity was reported through the Higgins’ I^2 statistic, and the analyses were stratified by regions according to the World Bank Country Classification.[19] Age × gender interactions were assessed through the inclusion of interaction terms. All analyses included sample weights for each country and were conducted using Stata 15.0 (StataCorp., College Station, TX, USA).

3. Results

The current study included datasets from 146 countries/territories, comprising 707,616 adolescents. The percentage of girls ranged from 26.8% (Benin) to 60.8% (Ireland), while the percentage of adolescents ≤14 years ranged from 13.1% (Benin) to 85.6% (Venezuela) (Supplementary Table 1). The included countries were from East Asia & the Pacific (*n* = 28), Europe & Central Asia (*n* = 37), Latin America & the Caribbean (*n* = 36), the Middle East & North Africa (*n* = 18), North America (*n* = 2), South Asia (*n* = 8), and Sub-Saharan Africa (*n* = 17). Supplementary Table 1 presents further details of each survey included.

The age-stratified analysis revealed that the global prevalence of ≥60 min of MVPA 1 or more days per week was 78% (95%CI: 76.0–79.0) among those ≤14 years and 79% (95%CI: 77.0–80.0) among those >14 years. For both age groups, Europe/Central Asia and North America were the regions with a higher prevalence of ≥60 min of MVPA 1 or more days per week (Table 1). The prevalence of ≥60 min of MVPA 1 or more days per week among adolescents ≤14 years and >14 years by country/territory is presented in Supplementary Table 2A. Regarding younger adolescents (≤14 years), 40 countries/territories presented >90% of ≥60 min of MVPA 1 or more days per week, while in 15 countries/territories this prevalence was ≤60%. For the >14 years adolescents, the prevalence of ≥60 min of MVPA 1 or more days per week was >90% in 36 countries/territories, while 7 countries/territories had a lower than 60% prevalence of ≥60 min of MVPA 1 or more days per week.

The absolute gender differences in prevalence of ≥60 min of MVPA 1 or more days per week were 3 p.p. and 7 p.p. among those ≤14 and >14 years, respectively. The absolute differences by country/territory are presented in Figs. 1 and 2. Among participants ≤14 years, the highest absolute differences (boys *vs.* girls) were observed in Egypt (28 p.p.), Brazil (17.5 p.p.), and St. Vincent and the Grenadines (17.5 p.p.), with girls presenting a higher prevalence of ≥60 min of MVPA 1 or more days per week than boys in a few countries, such as the Cook Islands (-11.4 p.p.), Salomon Island (-9.3 p.p.), and Anguilla (-8.6 p.p.). For those >14 years, the highest absolute differences (boys *vs.* girls) were in Ecuador (28.7 p.p.), Brazil (28.2 p.p.), and Tokelau (25.4 p.p.). Similar to their younger counterparts, girls >14 years were more active than boys in a few countries, such as Samoa (-6.6 p.p.), Philippines (-3.1 p.p.), and Ghana (-2.0 p.p.). The prevalence (with their respective 95%CI) and the absolute differences between boys and girls are presented in Table S2A. The gap between boys and girls by age group is presented, overlaid, in Fig. 3, which indicates that gender inequalities seem to be higher among those >14 years (PR: 1.06 (95%CI: 1.03–1.10)). Interactions are presented in Supplementary Table 3A.

Table 2 presents the relative differences in the prevalence of ≥60 min of MVPA 1 or more days per week between boys and girls by world region. For both age groups, boys had a higher prevalence of ≥60 min of MVPA 1 or more days per week than girls, with greater differences among those >14 years ($PR_{\leq 14y}$: 1.04 (95%CI: 1.03–1.04), I^2 = 87.3% *vs.* $PR_{>14y}$: 1.09 (95%CI: 1.08–1.10), I^2 = 91.5%). Among those ≤14 years, East Asia & the Pacific ($PR_{\leq 14y}$: 1.02 (95%CI: 0.99–1.04)), Europe & Central Asia ($PR_{\leq 14y}$: 1.00 (95%CI: 1.00–1.00)), and North America ($PR_{\leq 14y}$: 1.01 (95%CI: 1.00–1.02)) did not present gender differences, while only North America did not present a significant gender

difference among those >14 years ($PR_{>14y}$: 1.05 (95%CI: 1.00–1.10)). The analyses for each country/territory included are presented in Supplementary Table 4A.

4. Discussion

The present study aimed to estimate the global prevalence of ≥60 min of MVPA 1 or more days per week among adolescents and to analyze possible gender inequalities in ≥60 min of MVPA 1 or more days per week. Our findings indicate an overall prevalence of ≥60 min of MVPA 1 or more days per week of 78% among younger (≤14 years old) and 79% among older adolescents (>14 years old), with large differences between world regions. We also observed gender inequalities in the prevalence of ≥60 min of MVPA 1 or more days per week among both age groups, with higher gaps between boys and girls in the older age group ((≤14 years old: girls, 76%; boys, 79%); (>14 years old: girls, 75%; boys, 82%))

Although global[6,7,12] and regional[17,20] studies have looked at the prevalence of physical activity and/or inequalities in physical activity, analyses and results from these studies tend to be framed according to physical activity guidelines (e.g., ≥60 min of daily MVPA), which may obscure important findings across the physical activity continuum and limit insights for the promotion of physical activity. As far as we know, only 1 previous study, done by Marques et al.,[21] sought to present the global prevalence of MVPA according to its weekly frequency, while only 2 others, by Fan and Zhang[22] and Smith et al.,[23] presented the prevalence of 0 days per week of ≥60 min/day of MVPA using GSHS data from 15 and 54 countries/territories, respectively. Despite the relevance of the study by Marques et al., the authors used data from 105 countries/territories but did not explore inequalities by country/territory. Thus, by using data from 146 countries/territories, the present study extends the literature with a more inclusive threshold that facilitates further discussion on differences in PA practice and considers windows of opportunities to engage in MVPA.[24]

Although the overall prevalence of ≥60 min of MVPA 1 or more days per week had been nearly 80% for both age groups, important differences were noted between the analyzed regions. Thus, our results reveal differences that could not be observed using cut-offs based on ≥60 min of daily MVPA alone. For instance, among the regions analyzed by Guthold et al.,[7] the highest levels of ≥60 min daily of MVPA were observed in high-income Western countries (boys) and South Asia (boys and girls). However, these regions showed huge differences in ≥60 min of MVPA 1 or more days per week,

with South Asia presenting a lower prevalence than Europe & Central Asia (≤14 years: -31p.p.; >14 years: -26p.p.) and North America (≤14 years: -31p.p.; >14 years: -31p.p.).

Moreover, our findings indicate that different intervention priorities might be needed for different countries/territories. Countries/territories with a lower prevalence of ≥60 min of MVPA 1 or more days per week might focus on promoting access/opportunities for participation in MVPA (e.g., through policies promoting the delivery and/or participation in physical education classes in school).[25,26] In addition, these country groups might include the assessment of ≥60 min of MVPA 1 or more days per week in different population subgroups, as well as its trends over the years, as an additional focus of their national physical activity surveillance. This can be a helpful strategy to identify groups with no or low MVPA (those who do not achieve 60 min of MVPA at least 1 day/week) for appropriate intervention targeting. Countries with a large coverage of ≥60 min of MVPA 1 or more days per week could seek to identify other critical frequency thresholds below physical activity guidelines.

Gender inequalities in physical activity among adolescents are well-known, and global and regional studies have reported that girls are less likely to meet the physical activity guidelines than boys.[7,12,17,27] However, until now, there has been less discussion of gender inequalities in other MVPA metrics/categories, especially in analyses stratified by age and country/territory. Accordingly, our findings showed a higher prevalence of ≥60 min of MVPA 1 or more days per week among boys, indicating that gender inequalities are pervasive and not restricted to meeting physical activity guidelines. Some explanations for gender inequalities in physical activity among adolescents have been discussed in the literature, such as gender-role cultural issues and greater family and school support for engagement in physical activities for boys than for girls.[28] Our findings also revealed that the magnitude of the inequality differs among world regions, with the greatest differences observed in Latin America & the Caribbean, the Middle East & North Africa, South Asia, and Sub-Saharan Africa. Thus, considering that some MVPA is better than none, countries with higher inequalities in ≥60 min of MVPA 1 or more days per week could prioritize adopting the whole-of-government and systems approaches that facilitate physically active lifestyles. When adopted nationally, such approaches could help eliminate inequalities in physical activity participation and promotion in adolescents.[29]

Although we observed gender inequalities among both age groups, absolute and relative inequalities were higher among the oldest adolescents. These findings are in line with previous studies showing that girls tend to have greater and earlier decreases in

total and moderate-to-vigorous physical activity than boys.[18,30,31] These findings might help to explain the greater differences among the older adolescent age group because these decreases may have accumulated over the years, accentuating differences between the genders. Furthermore, changes in adolescents' social environment (e.g., changes in opportunities for being active during school time[32,33]) might also affect physical activity practice, which may disproportionately disadvantage girls.[34]

4.1. Strengths and limitations

The strengths of this study include the use of surveys from 146 countries/territories, comprising 707,616 adolescents. In addition, to our knowledge, this is the first study presenting the global prevalence of ≥60 min of MVPA 1 or more days per week among adolescents and further stratifying findings by age group and gender. Limitations include the use of self-reported data to assess MVPA, which can introduce recall and/or social desirability biases into the estimates. However, global nationally representative objective data on MVPA among adolescents have not been widely available until now.[35] Despite the significant correlation between the days of ≥60 min of MVPA reported and MVPA assessed by accelerometer (ρ: 0.49 (0.32–0.62)),[36] the psychometric properties of the questions used to assess MVPA were not available for all the countries/territories analyzed. Thus, it is possible that adolescents did not identify relevant MVPA and for that reason reported 0 days/week of MVPA.[37] Neither the HBSC nor the GSHS used specific questions about participation in muscle-strengthening activities in the main questionnaire. This aspect is relevant as current WHO PA recommendations highlight the importance of performing muscle and bone strengthening activities at least 3 days per week to obtain health benefits.[1] Thus, more efforts are needed to incorporate the measurement of these activities in future global surveillance. Although we sought to include the most recent available survey data from each country/territory, the surveys ranged from 2003 to 2019, which could have introduced time-related bias into our estimates. Data from China, the UK, Venezuela, and Zimbabwe had no national coverage, and interpretations need to be made with caution. Most of the surveys analyzed were school based. Thus, a lack of response from adolescents not attending school may limits the translation of the current findings for adolescents who do not attend school.[24]

5. Conclusion

Our estimates indicated that approximately 8 out of 10 adolescents worldwide perform 60 min of MVPA at least 1 day per week. In addition, we found differences between regions, with almost all adolescents from Europe & Central Asia and North America reporting ≥60 min of MVPA 1 or more days per week (>94%), while the prevalence of ≥60 min of MVPA 1 or more days per week in the other regions was lower than 77%. We observed consistent gender inequalities in favor of boys when it comes to reaching ≥60 min of MVPA 1 or more days per week. Considering the benefits of MVPA on health outcomes tend to be curvilinear, increasing the prevalence of achieving ≥60 min of MVPA 1 or more days per week among adolescents and reducing related gender inequalities should be a priority when it comes to physical activity promotion.

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Authors' contributions

RHOA conceptualized the study, conducted the formal analysis, and wrote the original draft. AOW conceptualized the study, conducted the formal analysis, reviewed, and edited the manuscript. CLM, LLB, RMT, NAF, GMJ, RRV, RT, ALO, ECMS, RGW, MST, JBS, GIM reviewed and edited the manuscript. DRPS: conceptualized the study, supervised, conducted the formal analysis, reviewed, and edited the manuscript. All authors reviewed and approved the final manuscript. RHOA and AOW had full access to all the data in the study.

Competing interests

The authors declare they have no competing interests.

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Table 1 - Prevalence of ≥60 min of MVPA 1 or more days per week among adolescents by region (n = 707,616).

	≤14 years old			>14 years old		
	All	Girls	Boys	All	Girls	Boys
	% (95%CI)	% (95%CI)	% (95%CI)	% (95%CI)	% (95%CI)	% (95%CI)
East Asia & Pacific	71.0 (67.0- 75.0)	71.0 (67.0- 74.0)	72.0 (68.0- 75.0)	76.0 (73.0- 79.0)	73.0 (70.0- 75.0)	79.0 (75.0- 82.0)
Europe & Central Asia	97.0 (96.0- 97.0)	97.0 (96.0- 97.0)	97.0 (97.0- 97.0)	94.0 (94.0- 95.0)	93.0 (92.0- 94.0)	96.0 (95.0- 96.0)
Latin America & Caribbean	71.0 (68.0- 73.0)	69.0 (65.0- 72.0)	71.0 (64.0- 78.0)	72.0 (68.0- 77.0)	68.0 (61.0- 74.0)	77.0 (74.0- 80.0)
Middle East & North Africa	75.0 (71.0- 79.0)	71.0 (65.0- 77.0)	77.0 (72.0- 83.0)	73.0 (68.0- 78.0)	67.0 (60.0- 73.0)	78.0 (74.0- 82.0)
North America	97.0 (96.0- 97.0)	96.0 (96.0- 97.0)	97.0 (97.0- 98.0)	95.0 (94.0- 95.0)	93.0 (93.0- 94.0)	96.0 (96.0- 97.0)
South Asia	66.0 (56.0- 76.0)	63.0 (50.0- 76.0)	69.0 (61.0- 77.0)	68.0 (57.0- 79.0)	62.0 (52.0- 72.0)	72.0 (61.0- 83.0)
Sub-Saharan Africa	67.0 (64.0- 70.0)	64.0 (61.0- 67.0)	70.0 (66.0- 74.0)	72.0 (67.0- 76.0)	68.0 (64.0- 71.0)	75.0 (71.0- 79.0)
Overall	78.0 (76.0- 79.0)	76.0 (74.0- 78.0)	79.0 (76.0- 81.0)	79.0 (77.0- 80.0)	75.0 (73.0- 77.0)	82.0 (80.0- 83.0)

Abbreviations: 95%CI = 95% confidence interval; MVPA = moderate-to-vigorous physical activity.

Table 2 - Relative difference in the prevalence of ≥60 min of MVPA 1 or more days per week between boys and girls (n = 707,616).

	≤14 years old			>14 years old		
	PR (95%CI)	% weight	I^2 (%)	PR (CI95%)	% weight	I^2 (%)
East Asia & Pacific	1.02 (0.99- 1.04)	13.39	70.8	1.08 (1.05- 1.11)	17.48	85.4
Europe & Central Asia	1.00 (1.00- 1.00)	44.79	56.6	1.02 (1.01- 1.03)	32.31	75.7
Latin America & Caribbean	1.07 (1.04- 1.10)	16.64	85.0	1.15 (1.11- 1.18)	20.55	89.8
Middle East & North Africa	1.11 (1.06- 1.16)	11.71	93.5	1.16 (1.12- 1.20)	11.21	83.7
North America	1.01 (1.00- 1.02)	2.53	-	1.05 (1.00- 1.10)	1.78	88.6
South Asia	1.11 (1.03- 1.18)	4.24	88.6	1.15 (1.09- 1.21)	5.29	82.6
Sub-Saharan Africa	1.09 (1.05- 1.13)	6.69	66.2	1.10 (1.06- 1.14)	11.38	81.1
Overall	1.04 (1.03- 1.04)	100.0	87.3	1.09 (1.08- 1.10)	100.0	91.5

Note. Girls were the reference group.

Abbreviations: 95%CI = 95% confidence interval; MVPA = moderate-to-vigorous physical activity; PR = prevalence ratio.

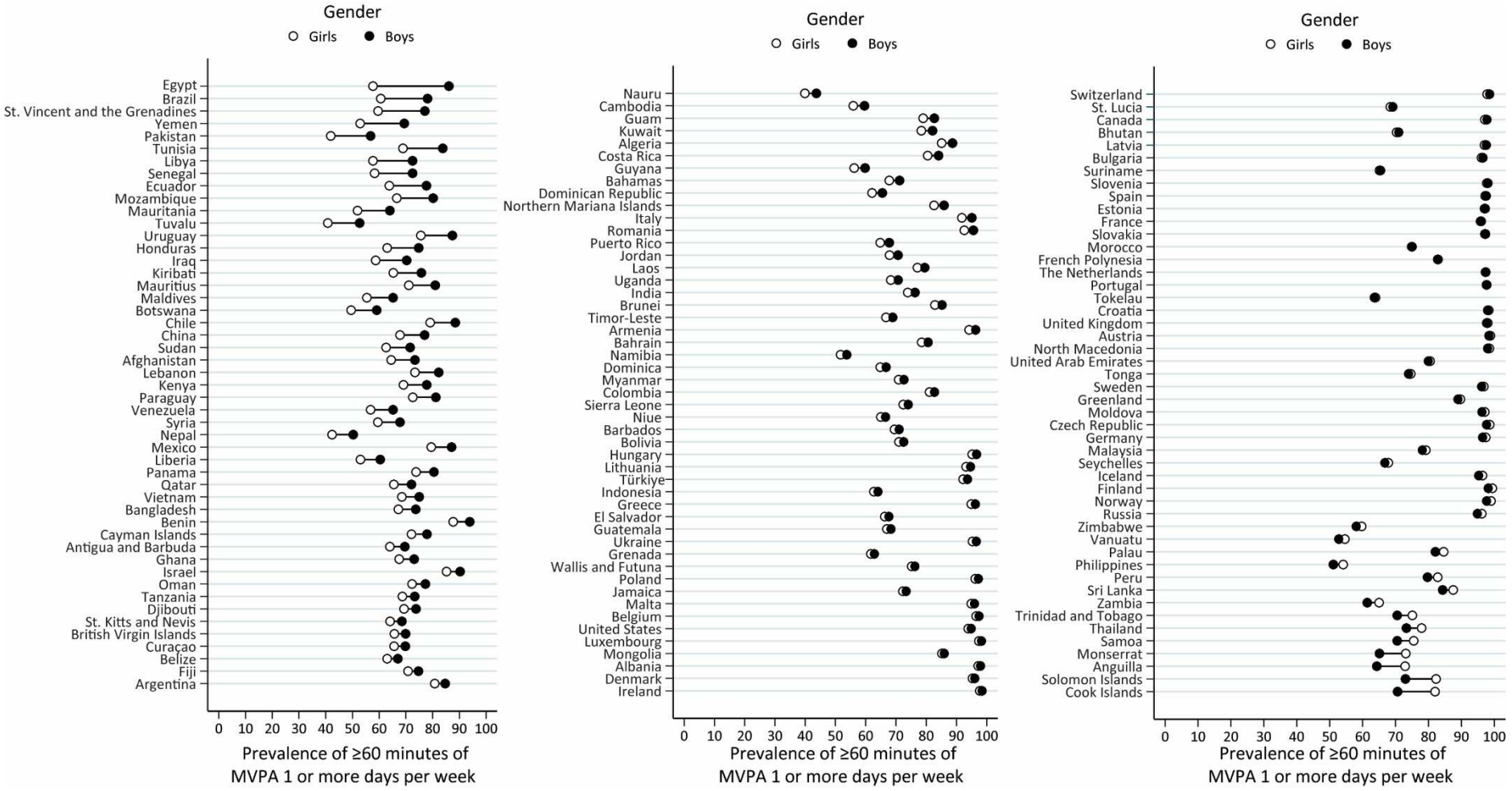

Fig 1 - Absolute difference in prevalence of ≥60 min of MVPA 1 or more days per week between young girls and boys (≤14 years old). MVPA = moderate-to-vigorous physical activity.

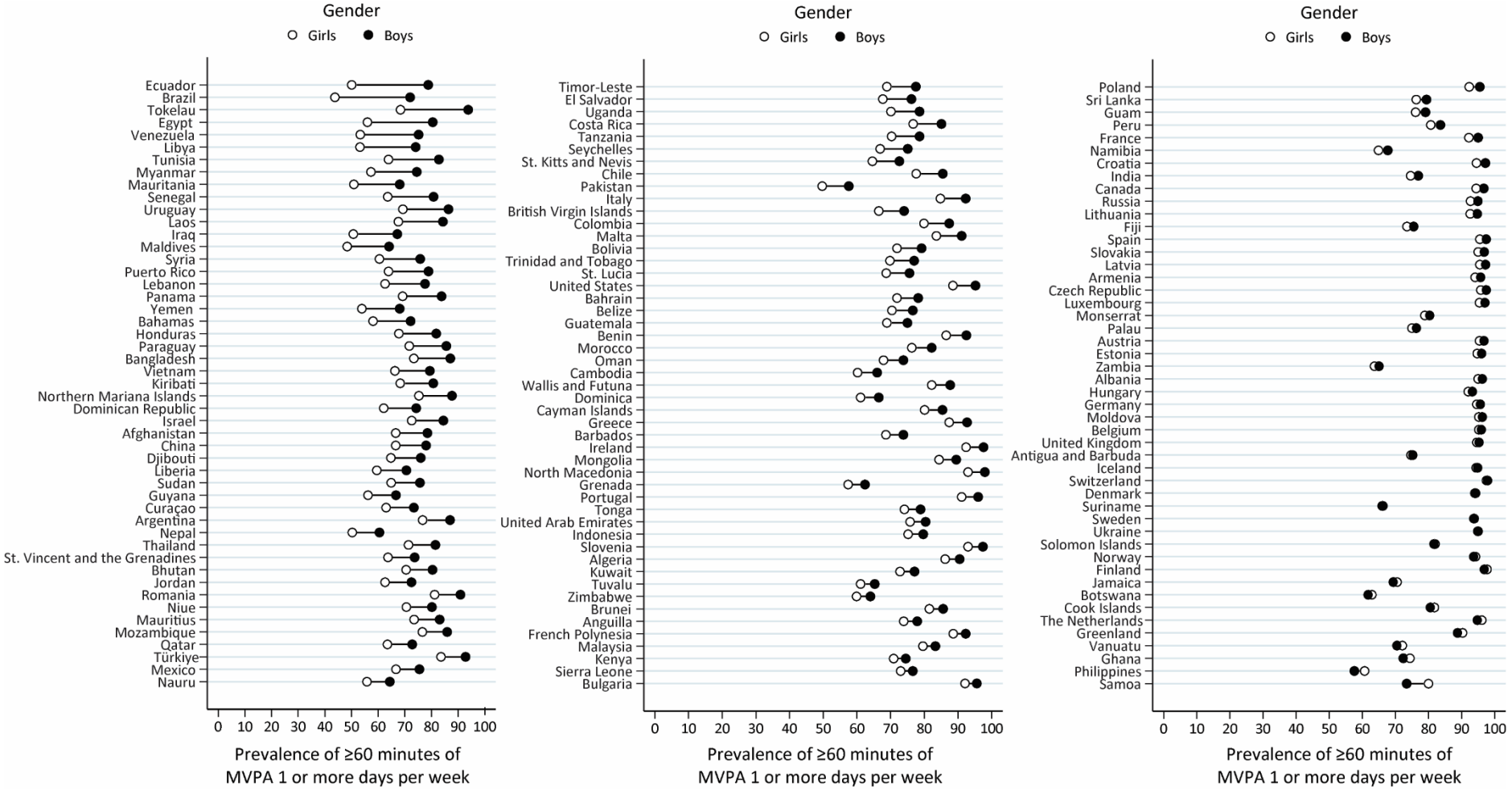

Fig 2 - Absolute difference in prevalence of ≥60 min of MVPA 1 or more days per week between young girls and boys (>14 years old). MVPA = moderate-to-vigorous physical activity.

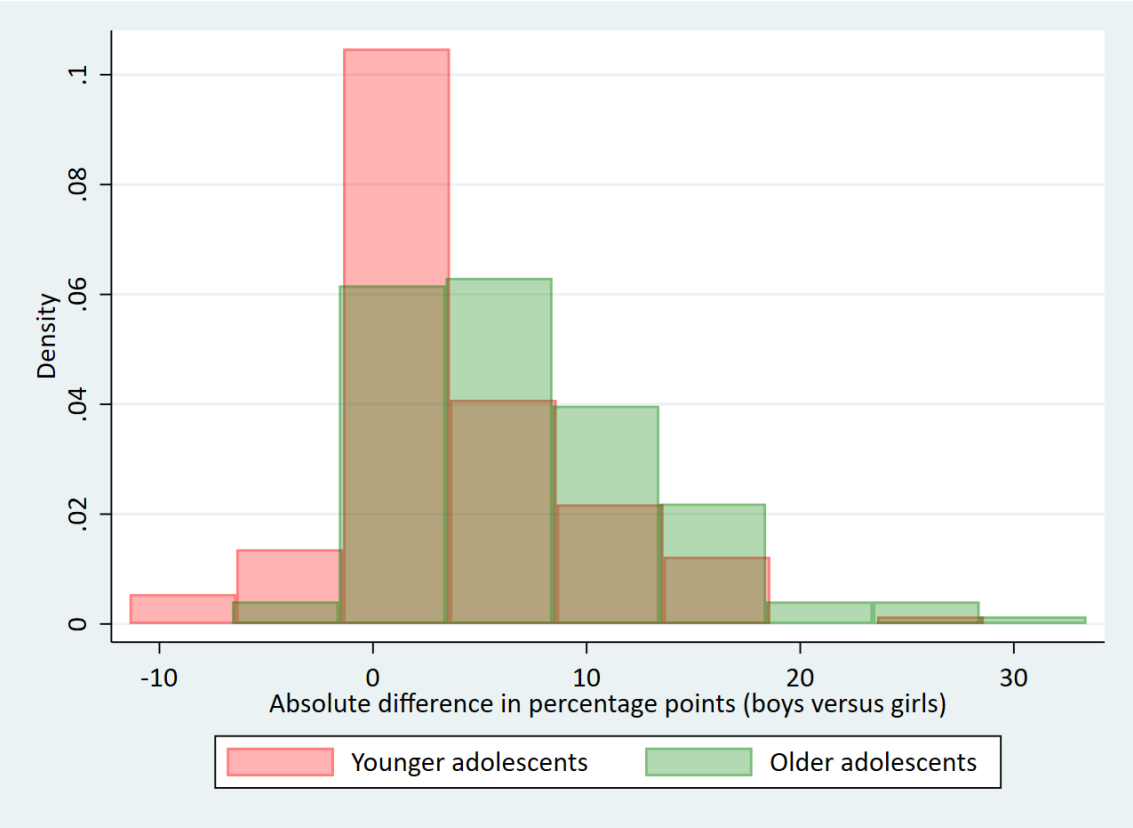

Fig 3 - Gender difference in the prevalence of ≥60 min of MVPA 1 or more days per week between younger (≤14 years old) and older adolescents (> 14 years old). MVPA = moderate-to-vigorous physical activity.

Supplementary Material A

Global School Health Survey (GSHS)

The GSHS aims to provide data about risk and protective factors among students. The GSHS was developed by the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) in collaboration with UNICEF, UNESCO, and UNAIDS.[1] A 2-stage sample design was used in the GSHS: 1) the schools, selected with probability proportional to enrollment size, reflect the first level; 2) the classrooms, which were randomly selected, and all students in selected classes were eligible to participate.

Health Behaviour in School-aged Children (HBSC)

The HBSC is a cross-national school-based study that includes more than 40 countries, especially across Europe and North America. The HBSC surveys are carried out every four years and aim to assess factors related to young people's health, with a focus on 11-, 13- and 15 years-old adolescents. Most of the students were selected by random selection of school classes. Additional details on the sampling procedure are elsewhere.[2]

Youth Risk Behavior Surveillance System (YRBSS)

The YRBSS uses a two-stage cluster sample design, where the schools are selected with probability proportional to the enrollment size (first level) and classrooms are selected randomly (second level). In each selected classroom, all students are eligible for participation.[3]

Brazil National School Health Survey (*Pesquisa Nacional de Saúde do Escolar* - PeNSE)

The PeNSE seeks to assess risk factors for health among students enrolled in Brazilian public and private schools. Briefly, the data were collected by the Brazilian Institute of Geography and Statistics, the Ministry of Health, and the Ministry of Education.[4] The 2015 PeNSE adopted a cluster sampling procedure that included schools in the 26 state capitals and Federal District, and 26 other municipalities, resulting in 53 strata. In capitals, the schools composed the first level, while classrooms were the second level. In non-capitals, three stages were used, with municipalities as primary, schools as the second, and classrooms as the third level. The PeNSE is composed of

two databases (Sample 1 and Sample 2). We used Sample 2 due to the greater representativeness of students aged 13-17y.

Colombia National School Health Survey (*Encuesta Nacional de Salud Escolar* – ENSE)

The ENSE aims to assess factors related to the health of students aged 13-17 years, such as food behaviour, physical activity, alcohol use, and oral health.[5] The 2017 ENSE adopted a cluster sampling in 3 stages, with municipalities as primary, schools as second, and classrooms as the third level.

Ecuador National Health and Nutrition Survey (*Encuesta Nacional de Salud y Nutrición* - ENSANUT)

The 2018 ENSANUT sought to raise information on risk and protective factors for health among the Ecuadorian population.[6] The sample was obtained by three-stage sampling. The first stage was formed by census tracts; the second by households; and the third by residents. In each selected household (randomly), a child or adolescent 5-17 years old were selected using the nearest birthday method. The sample was composed of 23,621 subjects (5-17y). Considering the exclusion by age (5-9y), the initial sample used by the present study comprised 13,438 adolescents.

Mexico National Health and Nutrition Survey (*Encuesta Nacional de Salud y Nutrición* - ENSANUT)

The 2016 ENSANUT aims to present information on risk and protective factors for health among the Mexican population, as well as analyse the coverage of national health programs. The sampling process used in ENSANUT was different between Urban and Rural areas, and more details can be found elsewhere.[7] Briefly, the adolescents were selected at the household level, and whenever possible, in each selected household, one adolescent (10-19 years old) was selected to participate in the survey.

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Chart S1 - Procedure used to categorize the ≥60 minutes of MVPA one or more days per week in each survey included.

Survey (Country)	Physical activity assessment	Possible answers	Dicotomization
GSHS[a] (GSHS countries)	During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?	a) 0 days; b) 1 day; c) 2 days; d) 3 days; e) 4 days; f) 5 days; g) 6 days; h) 7 days.	0 days: Zero MVPA; ≥1 days: ≥60 minutes of MVPA one or more days per week.
HBSC[b] (HBSC countries)	During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?	a) 0 days; b) 1 day; c) 2 days; d) 3 days; e) 4 days; f) 5 days; g) 6 days; h) 7 days.	0 days: Zero MVPA; ≥1 days: ≥60 minutes of MVPA one or more days per week.
YRBSS[c] (YRBSS countries)	During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?	a) 0 days; b) 1 day; c) 2 days; d) 3 days; e) 4 days; f) 5 days; g) 6 days; h) 7 days.	0 days: Zero MVPA; ≥1 days: ≥60 minutes of MVPA one or more days per week.
PeNSE[d] (Brazil)	During the past 7 days, on how many days were you physically active for a total of at least 60 minutes (1 hour) per day?	a) No days in the last 7 days; b) 1 day in the last 7 days; c) 2 days in the last 7 days; d) 3 days in the last 7 days; e) 4 days in the last 7 days; f) 5 days in the last 7 days; g) 5 days plus Saturday, in the last 7 days; h) 5 days plus Saturday and Sunday in the last 7 days.	0 days: Zero MVPA; ≥1 days: ≥60 minutes of MVPA one or more days per week.

ENSE[e] (Colombia)	During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?	a) 0 days; b) 1 day; c) 2 days; d) 3 days; e) 4 days; f) 5 days; g) 6 days; h) 7 days.	0 days: Zero MVPA; ≥1 days: ≥60 minutes of MVPA one or more days per week.
ENSANUT[f] (Ecuador)	During the past 7 days, on how many days were you physically active for a total of at least 60 min per day? (exclude physical education classes at school).	Open question.	0 days: Zero MVPA; ≥1 days: ≥60 minutes of MVPA one or more days per week.
ENSANUT[g] (Mexico)	For participants ≤14y During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?	a) 0 days; b) 1 day; c) 2 days; d) 3 days; e) 4 days; f) 5 days; g) 6 days; h) 7 days.	0 days: Zero MVPA; ≥1 days: ≥60 minutes of MVPA one or more days per week.
ENSANUT[g] (Mexico)	For participants >14y Was obtained information on the time spent in moderate and vigorous physical activity in one day on the previous seven days, separately. Then, we sum up the time spent at each physical activity intensity, assuming they refer to the same day.	-	Participants who spent ≥60 minutes of moderate to vigorous physical activity were coded as "≥60 minutes of MVPA one or more days per week.".

Note: [a]Global School-based Student Health Survey; [b]Health Behaviour among School-aged Children; [c]Youth Risk Behavior Surveillance System.[d]*Pesquisa Nacional de Saúde do Escolar*. [e]*Encuesta Nacional de Salud Escolar*.[f] *Encuesta Nacional de Salud y Nutrición* – Ecuador.[g]*Encuesta Nacional de Salud y Nutrición* – Mexico

Table S1A - Sample characteristics.

Country	Survey year	Survey	Sample size	Missing	Final sample	Girls (%)	≤14y (%)	Coverage
East Asia & Pacific								
Brunei	2014	GSHS	2,599	49	2,550	50·2	48.7	
Cambodia	2013	GSHS	3,806	44	3,762	47.7	32.9	
China	2003	GSHS	9,015	224	8,791	48.8	74.5	Beijing, Hangzhou, Wuhan, and Urumqi
Cook Islands	2015	GSHS	701	10	691	51.4	32.1	
Fiji	2016	GSHS	3,705	216	3,489	51.2	22.6	
French Polynesia	2015	GSHS	3,216	102	3,114	51.0	46.1	
Guam	2019	YRBS	2,411	121	2,290	47.5	46.6	
Indonesia	2015	GSHS	11,142	263	10,879	51.0	67.6	
Kiribati	2011	GSHS	1,582	27	1,555	52.9	55.9	
Laos	2015	GSHS	3,683	58	3,625	46.8	16.0	
Malaysia	2012	GSHS	25,507	213	25,294	49.9	41.7	
Mongolia	2013	GSHS	5,393	84	5,309	51.8	49.2	
Myanmar	2016	GSHS	2,838	54	2,784	53.5	67.4	
Nauru	2011	GSHS	578	86	492	56.1	56.9	
Niue	2010	GSHS	141	4	137	41.7	48.7	
Northern Mariana Islands	2019	YRBS	4,163	118	4,045	48.5	45.0	
Palau	2015	YRBS	1,852	134	1,718	46.3	15.1	
Philippines	2015	GSHS	8,761	108	8,653	50.6	49.8	
Samoa	2017	GSHS	1,955	158	1,797	53.5	40.4	
Solomon Islands	2011	GSHS	1,421	125	1,296	45.9	43.7	
Thailand	2015	GSHS	2,508	42	2,466	54.5	51.1	
Timor-Leste	2015	GSHS	3,704	256	3,448	49.3	24.4	
Tokelau	2014	GSHS	140	10	130	46.2	59.9	
Tonga	2017	GSHS	3,333	65	3,268	49.3	56.1	
Tuvalu	2013	GSHS	943	66	877	51.9	59.1	
Vanuatu	2016	GSHS	2,159	67	2,092	50.6	33.8	
Vietnam	2013	GSHS	3,331	23	3,308	53.1	21.6	
Wallis and Futuna	2015	GSHS	1,117	68	1,049	52.5	43.4	
Europe & Central Asia								
Albania	2014	HBSC	5,024	209	4,815	51.2	65.5	
Armenia	2014	HBSC	3,679	336	3,343	52.1	71.4	
Austria	2014	HBSC	3,458	76	3,382	53.1	62.3	
Belgium	2014	HBSC	10,285	146	10,139	48.1	62.6	
Bulgaria	2014	HBSC	4,796	114	4,682	47.0	65.5	
Croatia	2014	HBSC	5,741	213	5,528	49.6	64.3	
Czech Republic	2014	HBSC	5,082	66	5,016	52.4	64.0	
Denmark	2014	HBSC	3,891	80	3,811	53.6	62.5	
Estonia	2014	HBSC	4,057	35	4,022	49.9	60.3	
Finland	2014	HBSC	5,925	126	5,799	51.1	58.7	
France	2014	HBSC	5,691	346	5,345	47.3	69.2	
Germany	2014	HBSC	5,961	184	5,777	49.0	63.3	
Greece	2014	HBSC	4,141	55	4,086	50.2	64.0	
Greenland	2014	HBSC	1,020	73	947	51.3	65.6	
Hungary	2014	HBSC	3,935	151	3,784	50.4	69.7	
Iceland	2014	HBSC	10,602	474	10,128	50.2	64.7	
Ireland	2014	HBSC	4,098	193	3,905	60.8	60.9	
Italy	2014	HBSC	4,098	136	3,962	49.9	63.9	
Latvia	2014	HBSC	5,557	72	5,485	52.5	64.5	
Lithuania	2010	HBSC	5,338	92	5,246	48.6	63.3	
Luxembourg	2014	HBSC	3,318	338	2,980	53.2	63.5	
Moldova	2014	HBSC	4,648	0	4,648	49.5	64.9	
Netherlands	2014	HBSC	4,301	128	4,173	49.1	66.2	
North Macedonia	2014	HBSC	4,218	134	4,084	49.9	63.4	
Norway	2014	HBSC	3,422	356	3,156	51.8	70.1	
Poland	2014	HBSC	4,545	86	4,459	50.3	65.2	
Portugal	2014	HBSC	4,989	283	4,706	52.4	70.3	
Romania	2014	HBSC	3,980	69	3,911	52.8	63.3	

Russia	2014	HBSC	4,716	242	4,474	56.1	67.8	
Slovakia	2014	HBSC	6,099	169	5,930	49.7	67.9	
Slovenia	2014	HBSC	4,997	30	4,967	51.0	65.7	
Spain	2014	HBSC	11,136	569	10,567	51.2	64.0	
Sweden	2014	HBSC	7,700	263	7,437	50.4	62.8	
Switzerland	2014	HBSC	6,634	211	6,423	50.5	64.5	
Türkiye	2010	HBSC	5,664	370	5,294	51.9	63.3	
Ukraine	2014	HBSC	4,552	39	4,513	52.6	62.8	
United Kingdom	2014	HBSC	16,421	606	15,815	49.5	61.4	England, Scotland, and Wales
Latin America & Caribbean								
Anguilla	2016	GSHS	813	34	779	51.2	46.1	
Antigua and Barbuda	2009	GSHS	1,186	70	1,116	49.2	66.9	
Argentina	2018	GSHS	56,981	1,984	54,997	52.1	45.8	
Bahamas	2013	GSHS	1,357	49	1,308	52.5	82.9	
Barbados	2011	GSHS	1,629	75	1,554	51.2	58.5	
Belize	2011	GSHS	2,112	111	2,001	51.9	63.5	
Bolivia	2018	GSHS	7,931	643	7,288	49.2	30.2	
Brazil	2015	PeNSE	16,556	110	16,446	49.1	46.0	
British Virgin Islands	2009	GSHS	1,664	37	1,627	52.9	57.3	
Cayman Islands	2007	GSHS	1,299	77	1,222	50.3	68.1	
Chile	2013	GSHS	2,049	28	2,021	50.4	40.0	
Colombia	2017	ENSE	79,640	3,538	76,102	53.5	40.8	
Costa Rica	2009	GSHS	2,679	38	2,641	49.6	56.4	
Curaçao	2015	GSHS	2765	161	2,604	52.1	31.5	
Dominica	2009	GSHS	1,642	119	1,523	49.2	57.3	
Dominican Republic	2016	GSHS	1,481	96	1,385	50.6	25.3	
Ecuador	2018	ENSANUT	13,438	0	13,438	48.3	63.2	
El Salvador	2013	GSHS	1,915	63	1,852	48.2	58.3	
Grenada	2008	GSHS	1,542	97	1,445	55.6	59.7	
Guatemala	2015	GSHS	4,374	244	4,130	47.8	55.8	
Guyana	2010	GSHS	2,392	85	2,307	51.3	55.6	
Honduras	2012	GSHS	1,779	75	1,704	53.2	67.7	
Jamaica	2017	GSHS	1,667	70	1,597	51.4	30.9	
Mexico	2016	ENSANUT	3,341	60	3,281	52.7	52.6	
Monserrat	2008	GSHS	212	7	205	53.8	57.4	
Panama	2018	GSHS	2,948	109	2,839	52.9	32.9	
Paraguay	2017	GSHS	3,149	165	2,984	51.3	42.4	
Peru	2010	GSHS	2,882	42	2,840	49.4	51.8	
Puerto Rico	2019	YRBS	1,498	22	1,476	52.0	14.4	
St. Kitts and Nevis	2011	GSHS	1,740	50	1,690	48.8	49.9	
St. Lucia	2018	GSHS	1,970	60	1,910	52.9	53.8	
St. Vincent and the Grenadines	2018	GSHS	1,877	55	1,822	51.3	30.3	
Suriname	2016	GSHS	2,126	48	2,078	50.9	48.6	
Trinidad and Tobago	2017	GSHS	2,836	123	2,713	52.5	54.9	
Uruguay	2012	GSHS	3,524	84	3,440	54.4	53.0	
Venezuela	2003	GSHS	4,415	139	4,276	52.6	85.6	Barinas and Lara
Middle East & North Africa								
Algeria	2011	GSHS	4,532	127	4,405	52.0	57.6	
Bahrain	2016	GSHS	7,141	35	7,106	49.1	54.5	
Djibouti	2007	GSHS	1,777	71	1,706	40.1	29.0	
Egypt	2011	GSHS	2,568	123	2,445	50.1	80.5	
Iraq	2012	GSHS	2,038	76	1,962	42.8	51.1	
Israel	2014	HBSC	6,193	879	5,314	52.8	59.6	
Jordan	2007	GSHS	2,197	48	2,149	49.6	39.6	
Kuwait	2015	GSHS	3,637	372	3,265	49.8	35.7	
Lebanon	2017	GSHS	5,708	341	5,367	54.3	49.6	
Libya	2007	GSHS	2,242	114	2,128	50.1	68.4	
Malta	2014	HBSC	2,265	60	2,205	48.6	66.9	
Morocco	2016	GSHS	6,745	343	6,402	46.2	43.4	
Oman	2015	GSHS	3,468	125	3,343	50.3	29.1	

Qatar	2011	GSHS	2,021	192	1,829	52.5	82.9	
Syria	2010	GSHS	3,102	57	3,045	48.7	75.7	
Tunisia	2008	GSHS	2,870	87	2,783	49.8	70.0	
United Arab Emirates	2016	GSHS	5,849	168	5,681	50.6	38.5	
Yemen	2014	GSHS	2,655	190	2,465	44.8	41.8	
North America								
Canada	2014	HBSC	12,931	219	12,712	50.3	59.9	
United States	2010	HBSC	6,274	112	6,162	48.1	48.2	
South Asia								
Afghanistan	2014	GSHS	2,579	151	2,428	44.8	35.8	
Bangladesh	2014	GSHS	2,989	87	2,902	34.5	65.6	
Bhutan	2016	GSHS	7,576	138	7,438	52.0	28.9	
India	2007	GSHS	8,130	386	7,744	41.7	65.6	
Maldives	2009	GSHS	3,227	242	2,985	50.9	32.7	
Nepal	2015	GSHS	6,529	237	6,292	50.9	55.8	
Pakistan	2009	GSHS	5,192	75	5,117	38.6	61.7	
Sri Lanka	2016	GSHS	3,262	42	3,220	51.2	47.4	
Sub-Saharan Africa								
Benin	2016	GSHS	2,536	37	2,499	26.8	13.1	
Botswana	2005	GSHS	2,197	103	2,094	51.7	32.3	
Ghana	2007	GSHS	6,236	287	5,949	46.5	48.4	
Kenya	2003	GSHS	3,691	263	3,428	51.3	58.2	
Liberia	2017	GSHS	2,744	428	2,316	48.5	16.3	
Mauritania	2010	GSHS	2,063	112	1,951	45.9	35.2	
Mauritius	2017	GSHS	3,012	66	2,946	53.5	43.3	
Mozambique	2015	GSHS	1,918	124	1,794	46.9	28.8	
Namibia	2013	GSHS	4,531	141	4,390	53.2	24.9	
Senegal	2005	GSHS	3,154	95	3,059	40.5	59.6	
Seychelles	2015	GSHS	2,540	101	2,439	50.5	61.2	
Sierra Leone	2017	GSHS	2,798	117	2,681	48.6	35.4	
Sudan	2012	GSHS	2,211	137	2,074	46.9	39.5	
Tanzania	2014	GSHS	3,793	111	3,682	51.0	61.0	
Uganda	2003	GSHS	3,215	229	2,986	49.1	33.7	
Zambia	2004	GSHS	2,257	386	1,871	46.8	45.7	
Zimbabwe	2003	GSHS	5,665	297	5,368	50.3	39.9	Bulawayo, Harare, and Manicaland

Table S2A - Prevalence of ≥60 minutes of MVPA one or more days per week among adolescents by age group and gender. The gap is the absolute difference between boys and girls, in percentage points.

Country	≤14 years old				>14 years old			
	All	Girls	Boys	Gap	All	Girls	Boys	Gap
East Asia & Pacific								
Brunei	84.0 (81.7- 86.1)	82.9 (79.6- 85.7)	85.2 (81.8- 88.0)	2.3	83.6 (81.4 - 85.5)	81.5 (78.4 - 84.2)	85.6 (82.5 - 88.3)	4.1
Cambodia	57.7 (54.4- 60.9)	55.9 (51.6- 60.1)	59.6 (54.6 - 64.4)	3.7	63.4 (61.1 - 65.6)	60.2 (57.1 - 63.3)	66.0 (62.7 - 69.2)	5.8
China	72.4 (71.1 - 73.6)	67.8 (66.0 - 69.6)	77.0 (75.2 - 78.7)	9.2	73.1 (70.8 - 75.2)	66.6 (63.1 - 70.0)	78.0 (75.1 - 80.7)	11.4
Cook Islands	76.4 (70.2 - 81.7)	82.0 (73.5 - 88.2)	70.6 (61.1 - 78.6)	-11.4	81.2 (77.4 - 84.5)	81.8 (76.4 - 86.1)	80.6 (74.9 - 85.3)	-1.2
Fiji	72.6 (69.2 - 75.7)	70.8 (66.0 - 75.1)	74.7 (69.9 - 79.0)	3.9	74.5 (72.7 - 76.1)	73.5 (71.0 - 75.8)	75.5 (73.0 - 77.8)	2.0
French Polynesia	82.8 (80.3 - 85.1)	82.9 (79.2 - 86.0)	82.8 (79.0 - 86.0)	-0.1	90.5 (89.0 - 91.8)	88.6 (86.4 - 90.5)	92.3 (90.1 - 94.1)	3.7
Guam	80.8 (78.0 - 83.4)	79.0 (75.0 - 82.5)	82.7 (78.5 - 86.2)	3.7	77.7 (74.3 - 80.8)	76.1 (70.6 - 80.9)	79.1 (74.7 - 83.0)	3.0
Indonesia	63.4 (62.1 - 64.6)	62.7 (61.0 - 64.4)	64.0 (62.2 - 65.8)	1.3	77.4 (76.0 - 78.8)	75.2 (73.1 - 77.1)	79.7 (77.6 - 81.6)	4.5
Kiribati	70.2 (66.9 - 73.2)	65.3 (60.8 - 69.4)	75.8 (71.1 - 80.0)	10.5	74.2 (70.8 - 77.4)	68.3 (63.5 - 72.8)	80.7 (75.8 - 84.8)	12.4
Laos	78.1 (74.8 - 81.2)	77.1 (72.6 - 81.0)	79.5 (74.0 - 84.0)	2.4	76.7 (75.1 - 78.3)	67.6 (65.0 - 70.0)	84.3 (82.1 - 86.3)	16.7
Malaysia	78.8 (77.7 - 79.7)	79.2 (77.8 - 80.6)	78.2 (76.8 - 79.6)	-1.0	81.5 (80.7 - 82.2)	79.6 (78.5 - 80.7)	83.3 (82.2 - 84.3)	3.7
Mongolia	85.5 (84.1 - 86.8)	85.2 (83.1 - 87.0)	85.9 (83.9 - 87.7)	0.7	86.8 (85.4 - 88.0)	84.4 (82.3 - 86.2)	89.5 (87.6 - 91.1)	5.1
Myanmar	71.7 (69.4 - 73.9)	70.9 (67.7 - 74.0)	72.6 (69.1 - 75.8)	1.7	65.5 (62.6 - 68.2)	57.3 (53.3 - 61.1)	74.5 (70.4 - 78.1)	17.2
Nauru	41.7 (35.6 - 48.1)	39.9 (32.0 - 48.4)	43.7 (34.4 - 53.4)	3.8	59.0 (52.2 - 65.5)	55.8 (47.3 - 63.9)	64.4 (52.7 - 74.7)	8.6
Niue	65.8 (53.1 - 76.5)	65.0 (46.1 - 80.1)	66.5 (49.0 - 80.4)	1.5	76.7 (64.5 - 85.6)	70.6 (48.3 - 86.1)	80.2 (65.7 - 89.6)	9.6
Northern Mariana Islands	84.3 (82.6 - 85.8)	82.6 (80.1 - 84.8)	85.9 (83.6 - 88.0)	3.3	81.7 (80.0 - 83.4)	75.3 (72.5 - 77.9)	87.7 (85.5 - 89.6)	12.4
Palau	83.3 (79.3 - 86.8)	84.6 (78.3 - 89.3)	82.1 (76.2 - 86.8)	-2.5	75.7 (72.1 - 78.9)	75.0 (69.4 - 79.9)	76.3 (71.5 - 80.5)	1.3
Philippines	52.7 (50.9 - 54.4)	54.1 (51.7 - 56.4)	51.1 (48.6 - 53.7)	-3.0	59.1 (57.5 - 60.8)	60.7 (58.4 - 63.0)	57.6 (55.2 - 59.9)	-3.1
Samoa	73.3 (69.3 - 76.9)	75.5 (71.2 - 79.5)	70.5 (63.3 - 76.8)	-5.0	76.8 (73.9 - 79.5)	80.0 (76.7 - 83.0)	73.4 (68.4 - 77.8)	-6.6
Solomon Islands	77.6 (73.1 - 81.6)	82.3 (76.1 - 87.1)	73.0 (66.2 - 78.9)	-9.3	81.8 (78.5 - 84.8)	82.0 (77.0 - 86.1)	81.7 (77.0 - 85.6)	-0.3
Thailand	75.7 (73.2 - 78.0)	77.9 (74.6 - 80.9)	73.3 (69.5 - 76.7)	-4.6	75.6 (73.0 - 78.0)	71.4 (67.9 - 74.6)	81.5 (77.6 - 84.8)	10.1
Timor-Leste	67.7 (64.7 - 70.6)	66.7 (62.7 - 70.4)	68.9 (64.2 - 73.2)	2.2	73.4 (71.5 - 75.2)	68.9 (66.1 - 71.6)	77.5 (74.9 - 79.9)	8.6
Tokelau	63.8 (51.6 - 74.4)	63.9 (46.9 - 78.1)	63.6 (46.4 - 78.0)	-0.3	80.8 (67.8 - 89.4)	68.4 (49.0 - 83.0)	93.8 (77.5 - 98.5)	25.4
Tonga	74.3 (72.2 - 76.3)	74.6 (71.7 - 77.3)	74.0 (70.8 - 76.8)	-0.6	76.5 (74.2 - 78.6)	74.1 (70.9 - 77.0)	78.9 (75.6 - 81.9)	4.8
Tuvalu	46.8 (42.6 - 51.0)	40.8 (35.0 - 46.8)	52.7 (46.7 - 58.6)	11.9	63.0 (57.7 - 68.0)	61.1 (53.9 - 67.8)	65.3 (57.3 - 72.4)	4.2
Vanuatu	53.8 (50.0 - 57.5)	54.6 (49.8 - 59.2)	52.8 (46.6 - 58.9)	-1.8	71.3 (68.6 - 73.8)	72.1 (68.4 - 75.6)	70.5 (66.5 - 74.2)	-1.6
Vietnam	71.5 (68.5 - 74.4)	68.5 (64.2 - 72.5)	75.0 (70.6 - 78.9)	6.5	72.4 (70.5 - 74.3)	66.3 (63.5 - 69.0)	79.4 (76.7 - 81.8)	13.1
Wallis and Futuna	75.7 (71.8 - 79.2)	75.2 (69.8 - 79.9)	76.2 (70.4 - 81.2)	1.0	84.8 (81.6 - 87.6)	82.2 (77.3 - 86.2)	87.7 (83.0 - 91.2)	5.5
Europe & Central Asia								
Albania	97.5 (96.9 - 98.0)	97.2 (96.3 - 97.9)	97.9 (97.0 - 98.5)	0.7	95.6 (94.5 - 96.5)	95.0 (93.3 - 96.3)	96.2 (94.7 - 97.4)	1.2
Armenia	95.3 (94.3 - 96.1)	94.2 (92.8 - 95.4)	96.3 (95.0 - 97.2)	2.1	94.8 (93.2 - 96.0)	94.1 (91.8 - 95.8)	95.7 (93.2 - 97.3)	1.6
Austria	98.6 (98.0 - 99.0)	98.8 (97.9 - 99.3)	98.4 (97.4 - 99.0)	-0.4	96.0 (94.8 - 96.9)	95.4 (93.6 - 96.7)	96.7 (94.9 - 97.9)	1.3
Belgium	97.0 (96.5 - 97.4)	96.5 (95.8 - 97.1)	97.4 (96.8 - 97.9)	0.9	95.6 (94.9 - 96.2)	95.2 (94.0 - 96.1)	95.9 (95.0 - 96.7)	0.7
Bulgaria	96.3 (95.6 - 96.9)	96.1 (95.0 - 97.0)	96.5 (95.4 - 97.3)	0.4	94.0 (92.8 - 95.1)	92.1 (89.8 - 93.8)	95.6 (94.1 - 96.8)	3.5
Croatia	98.1 (97.6 - 98.5)	98.3 (97.6 - 98.8)	98.0 (97.2 - 98.5)	-0.3	95.9 (95.0 - 96.7)	94.5 (92.9 - 95.8)	97.2 (96.0 - 98.0)	2.7
Czech Republic	98.2 (97.6 - 98.6)	98.6 (97.9 - 99.1)	97.7 (96.8 - 98.3)	-0.9	96.6 (95.6 - 97.3)	95.8 (94.3 - 96.9)	97.4 (96.1 - 98.3)	1.6
Denmark	95.6 (94.7 - 96.3)	95.3 (94.0 - 96.3)	96.0 (94.6 - 97.0)	0.7	94.1 (92.8 - 95.2)	94.0 (92.1 - 95.5)	94.2 (92.2 - 95.8)	0.2
Estonia	97.1 (96.4 - 97.7)	97.0 (95.9 - 97.9)	97.2 (96.1 - 98.0)	0.2	95.4 (94.2 - 96.3)	94.7 (92.9 - 96.1)	96.0 (94.4 - 97.2)	1.3
Finland	98.8 (98.4 - 99.1)	99.4 (98.9 - 99.6)	98.2 (97.5 - 98.8)	-1.2	97.3 (96.6 - 97.9)	97.7 (96.7 - 98.4)	96.9 (95.7 - 97.7)	-0.8
France	95.9 (95.2 - 96.5)	95.8 (94.7 - 96.7)	96.0 (94.9 - 96.8)	0.2	93.7 (92.3 - 94.8)	92.2 (90.1 - 94.0)	95.0 (93.1 - 96.4)	2.8
Germany	96.9 (96.3 - 97.4)	97.4 (96.5 - 98.0)	96.5 (95.5 - 97.2)	-0.9	95.1 (94.1 - 96.0)	94.6 (93.0 - 95.8)	95.6 (94.2 - 96.7)	1.0
Greece	95.5 (94.7 - 96.3)	94.9 (93.5 - 96.0)	96.2 (95.0 - 97.1)	1.3	89.9 (88.3 - 91.4)	87.4 (84.9 - 89.6)	92.7 (90.5 - 94.4)	5.3
Greenland	89.4 (86.7 - 91.6)	89.7 (85.9 - 92.6)	89.0 (84.9 - 92.1)	-0.7	89.6 (85.8 - 92.5)	90.3 (84.8 - 94.0)	88.8 (83.0 - 92.8)	-1.5
Hungary	95.9 (95.1 - 96.6)	95.2 (94.0 - 96.3)	96.6 (95.4 - 97.4)	1.4	92.6 (90.9 - 94.0)	92.0 (89.5 - 93.9)	93.2 (90.8 - 95.0)	1.2
Iceland	95.8 (95.3 - 96.3)	96.4 (95.7 - 97.0)	95.3 (94.5 - 96.0)	-1.1	94.6 (93.8 - 95.3)	94.4 (93.3 - 95.4)	94.8 (93.7 - 95.8)	0.4
Ireland	98.0 (97.3 - 98.5)	97.7 (96.8 - 98.4)	98.4 (97.4 - 99.0)	0.7	94.4 (93.1 - 95.4)	92.4 (90.5 - 93.9)	97.6 (96.0 - 98.6)	5.2
Italy	93.5 (92.5 - 94.4)	91.8 (90.2 - 93.2)	95.1 (93.8 - 96.2)	3.3	88.6 (86.8 - 90.1)	84.8 (81.9 - 87.2)	92.3 (90.1 - 94.0)	7.5
Latvia	97.2 (96.6 - 97.7)	97.0 (96.1 - 97.7)	97.5 (96.6 - 98.1)	0.5	96.3 (95.4 - 97.1)	95.5 (94.0 - 96.6)	97.2 (96.0 - 98.1)	1.7
Lithuania	93.9 (93.0 - 94.7)	93.2 (91.9 - 94.3)	94.6 (93.4 - 95.6)	1.4	93.7 (92.5 - 94.7)	92.6 (90.6 - 94.1)	94.7 (93.2 - 95.9)	2.1

Luxembourg	97.8 (97.0 - 98.4)	97.4 (96.2 - 98.2)	98.2 (97.1 - 98.9)	0.8	96.1 (94.8 - 97.1)	95.4 (93.4 - 96.8)	97.0 (95.1 - 98.2)	1.6
Moldova	96.7 (96.0 - 97.3)	97.1 (96.1 - 97.9)	96.3 (95.3 - 97.2)	-0.8	95.7 (94.6 - 96.6)	95.2 (93.5 - 96.5)	96.2 (94.7 - 97.3)	1.0
Netherlands	97.3 (96.7 - 97.9)	97.4 (96.5 - 98.1)	97.3 (96.2 - 98.0)	-0.1	95.4 (94.1 - 96.5)	96.1 (94.3 - 97.3)	94.8 (92.7 - 96.4)	-1.3
North Macedonia	98.2 (97.6 - 98.7)	98.5 (97.6 - 99.0)	98.0 (97.0 - 98.6)	-0.5	95.6 (94.4 - 96.5)	93.0 (90.9 - 94.7)	98.0 (96.8 - 98.8)	5.0
Norway	98.4 (97.8 - 98.8)	99.0 (98.3 - 99.5)	97.7 (96.6 - 98.4)	-1.3	94.0 (92.3 - 95.3)	94.2 (91.8 - 95.9)	93.7 (91.0 - 95.6)	-0.5
Poland	96.7 (96.0 - 97.3)	96.2 (95.1 - 97.1)	97.2 (96.3 - 98.0)	1.0	93.9 (92.6 - 95.0)	92.3 (90.3 - 94.0)	95.5 (93.8 - 96.8)	3.2
Portugal	97.7 (97.1 - 98.1)	97.7 (96.9 - 98.3)	97.6 (96.7 - 98.3)	-0.1	93.4 (92.0 - 94.6)	91.1 (88.9 - 93.0)	96.0 (94.2 - 97.3)	4.9
Romania	94.1 (93.1 - 94.9)	92.6 (91.0 - 93.9)	95.6 (94.3 - 96.6)	3.0	85.5 (83.5 - 87.2)	81.2 (78.4 - 83.8)	90.9 (88.4 - 92.9)	9.7
Russia	95.7 (94.9 - 96.3)	96.2 (95.2 - 97.0)	94.9 (93.6 - 96.0)	-1.3	93.7 (92.3 - 94.8)	92.7 (90.6 - 94.3)	94.9 (92.9 - 96.3)	2.2
Slovakia	97.2 (96.6 - 97.6)	97.1 (96.3 - 97.7)	97.3 (96.4 - 97.9)	0.2	96.0 (95.0 - 96.8)	95.0 (93.3 - 96.2)	96.8 (95.6 - 97.8)	1.8
Slovenia	97.8 (97.3 - 98.3)	97.7 (96.8 - 98.3)	98.0 (97.2 - 98.6)	0.3	95.0 (93.9 - 95.9)	93.0 (91.1 - 94.5)	97.4 (96.0 - 98.3)	4.4
Spain	97.3 (96.9 - 97.7)	97.2 (96.6 - 97.7)	97.5 (96.9 - 97.9)	0.3	96.4 (95.8 - 97.0)	95.5 (94.6 - 96.4)	97.4 (96.6 - 98.1)	1.9
Sweden	96.5 (95.9 - 97.0)	96.8 (96.0 - 97.4)	96.2 (95.4 - 96.9)	-0.6	93.7 (92.8 - 94.6)	93.7 (92.3 - 94.9)	93.8 (92.4 - 95.0)	0.1
Switzerland	98.1 (97.7 - 98.5)	97.8 (97.0 - 98.3)	98.5 (97.8 - 98.9)	0.7	97.7 (97.0 - 98.2)	97.5 (96.5 - 98.3)	97.8 (96.8 - 98.5)	0.3
Türkiye	92.9 (91.9 - 93.7)	92.2 (90.9 - 93.4)	93.6 (92.3 - 94.7)	1.4	88.2 (86.6 - 89.5)	83.6 (81.2 - 85.8)	92.8 (91.0 - 94.3)	9.2
Ukraine	95.9 (95.1 - 96.6)	95.3 (94.1 - 96.3)	96.5 (95.4 - 97.4)	1.2	94.9 (93.8 - 95.9)	95.0 (93.3 - 96.2)	94.9 (93.1 - 96.2)	-0.1
United Kingdom	97.8 (97.5 - 98.1)	98.0 (97.5 - 98.4)	97.7 (97.2 - 98.1)	-0.3	94.9 (94.2 - 95.5)	94.6 (93.6 - 95.4)	95.2 (94.1 - 96.1)	0.6
Latin America & Caribbean								
Anguilla	68.8 (63.6 - 73.5)	72.9 (65.7 - 79.1)	64.3 (56.7 - 71.3)	-8.6	75.9 (71.5 - 79.7)	73.9 (67.7 - 79.2)	77.9 (71.5 - 83.2)	4.0
Antigua and Barbuda	66.7 (63.0 - 70.2)	64.0 (58.9 - 68.7)	69.6 (64.2 - 74.5)	5.6	75.0 (69.8 - 79.5)	74.7 (67.0 - 81.1)	75.2 (68.0 - 81.3)	0.5
Argentina	82.6 (81.6 - 83.6)	80.8 (79.3 - 82.2)	84.7 (83.2 - 86.0)	3.9	81.7 (80.7 - 82.5)	76.7 (75.3 - 78.1)	87.0 (85.9 - 88.0)	10.3
Bahamas	69.4 (66.5 - 72.1)	67.8 (63.9 - 71.5)	71.2 (66.9 - 75.1)	3.4	65.7 (58.2 - 72.5)	58.1 (47.4 - 68.1)	72.2 (61.9 - 80.6)	14.1
Barbados	70.3 (67.1 - 73.2)	69.5 (65.2 - 73.5)	71.0 (66.4 - 75.3)	1.5	71.0 (66.9 - 74.8)	68.6 (62.9 - 73.9)	73.8 (67.8 - 79.1)	5.2
Belize	64.9 (62.2 - 67.5)	63.0 (59.3 - 66.6)	67.0 (63.0 - 70.8)	4.0	73.5 (70.1 - 76.6)	70.4 (65.4 - 74.9)	76.6 (71.9 - 80.8)	6.2
Bolivia	71.7 (69.7 - 73.6)	71.0 (68.1 - 73.7)	72.5 (69.7 - 75.1)	1.5	75.6 (74.4 - 76.8)	71.9 (69.9 - 73.7)	79.2 (77.5 - 80.7)	7.3
Brazil	69.3 (68.0 - 70.6)	60.6 (58.6 - 62.5)	78.1 (76.4 - 79.8)	17.5	58.4 (56.8 - 60.0)	43.8 (41.6 - 46.0)	72.0 (69.9 - 74.0)	28.2
British Virgin Islands	67.6 (64.5 - 70.6)	65.7 (61.6 - 69.6)	69.9 (65.1 - 74.4)	4.2	70.3 (66.6 - 73.7)	66.5 (61.3 - 71.4)	74.0 (68.8 - 78.6)	7.5
Cayman Islands	75.0 (72.0 - 77.8)	72.1 (67.7 - 76.1)	77.9 (73.6 - 81.7)	5.8	82.6 (78.2 - 86.3)	80.1 (73.8 - 85.1)	85.4 (78.8 - 90.2)	5.3
Chile	83.7 (81.2 - 86.0)	79.1 (75.2 - 82.6)	88.5 (85.1 - 91.2)	9.4	81.5 (78.6 - 84.2)	77.6 (73.1 - 81.6)	85.5 (81.5 - 88.7)	7.9
Colombia	81.8 (81.0 - 82.6)	81.1 (80.0 - 82.1)	82.7 (81.5 - 83.8)	1.6	83.4 (82.9 - 83.9)	79.9 (79.1 - 80.7)	87.4 (86.6 - 88.0)	7.5
Costa Rica	82.3 (80.2 - 84.2)	80.5 (77.5 - 83.1)	84.1 (81.2 - 86.7)	3.6	81.1 (78.6 - 83.4)	76.7 (72.9 - 80.2)	85.1 (81.7 - 87.9)	8.4
Curaçao	67.7 (64.6 - 70.6)	65.6 (61.3 - 69.6)	69.8 (65.3 - 74.0)	4.2	68.0 (65.6 - 70.3)	63.0 (59.8 - 66.2)	73.4 (69.8 - 76.8)	10.4
Dominica	65.7 (62.5 - 68.8)	64.8 (60.5 - 68.8)	66.7 (61.8 - 71.3)	1.9	64.0 (59.9 - 67.9)	61.1 (55.5 - 66.3)	66.5 (60.5 - 72.0)	5.4
Dominican Republic	63.7 (59.0 - 68.2)	62.1 (56.1 - 67.7)	65.5 (58.0 - 72.3)	3.4	68.2 (64.4 - 71.7)	62.1 (56.5 - 67.3)	74.3 (69.2 - 78.8)	12.2
Ecuador	71.0 (69.3 - 72.7)	63.8 (61.2 - 66.4)	77.7 (75.3 - 79.8)	13.9	64.8 (62.4 - 67.0)	50.1 (46.7 - 53.6)	78.8 (76.0 - 81.3)	28.7
El Salvador	66.9 (63.7 - 69.9)	66.3 (61.7 - 70.5)	67.6 (63.1 - 71.8)	1.3	72.3 (68.9 - 75.4)	67.7 (62.4 - 72.6)	76.2 (71.9 - 80.1)	8.5
Grenada	62.1 (58.8 - 65.4)	61.7 (57.3 - 65.9)	62.8 (57.5 - 67.8)	1.1	59.9 (55.3 - 64.5)	57.4 (50.8 - 63.8)	62.4 (55.7 - 68.7)	5.0
Guatemala	67.7 (63.9 - 71.3)	67.0 (61.6 - 72.0)	68.3 (62.9 - 73.3)	1.3	72.2 (67.8 - 76.2)	68.9 (62.4 - 74.7)	75.0 (68.8 - 80.2)	6.1
Guyana	57.9 (55.0 - 60.8)	56.2 (52.2 - 60.1)	59.8 (55.5 - 64.0)	3.6	61.4 (58.3 - 64.5)	56.2 (52.0 - 60.3)	66.7 (62.0 - 71.1)	10.5
Honduras	68.4 (65.5 - 71.1)	63.0 (58.9 - 66.9)	74.8 (70.7 - 78.5)	11.8	74.7 (70.9 - 78.2)	67.8 (61.9 - 73.1)	81.8 (76.8 - 85.9)	14.0
Jamaica	72.8 (68.9 - 76.3)	72.3 (67.0 - 77.0)	73.3 (67.5 - 78.5)	1.0	70.0 (66.8 - 72.9)	70.5 (66.3 - 74.4)	69.4 (64.6 - 73.9)	-1.1
Mexico	83.3 (79.9 - 86.2)	79.5 (73.9 - 84.1)	87.1 (83.1 - 90.3)	7.6	71.1 (66.7 - 75.2)	66.7 (60.8 - 72.2)	75.5 (68.9 - 81.1)	8.8
Monserrat	69.0 (59.2 - 77.4)	73.1 (59.3 - 83.5)	65.1 (50.8 - 77.2)	-8.0	79.5 (69.8 - 86.6)	78.9 (65.7 - 88.0)	80.3 (64.5 - 90.1)	1.4
Panama	77.0 (74.1 - 79.6)	73.8 (69.8 - 77.5)	80.5 (76.4 - 84.1)	6.7	76.1 (74.0 - 78.0)	69.2 (66.3 - 72.0)	83.8 (81.1 - 86.2)	14.6
Paraguay	76.5 (74.0 - 78.8)	72.6 (69.1 - 75.9)	81.2 (77.7 - 84.2)	8.6	78.8 (76.7 - 80.8)	71.7 (68.4 - 74.7)	85.6 (83.0 - 87.9)	13.9
Peru	81.3 (79.1 - 83.3)	82.8 (79.8 - 85.4)	79.7 (76.5 - 82.6)	-3.1	82.2 (80.0 - 84.2)	80.7 (77.5 - 83.6)	83.6 (80.6 - 86.2)	2.9
Puerto Rico	66.2 (59.0 - 72.7)	64.8 (54.8 - 73.7)	67.8 (57.0 - 77.0)	3.0	71.2 (68.6 - 73.6)	63.9 (60.1 - 67.5)	78.9 (75.3 - 82.0)	15.0
St. Kitts and Nevis	66.3 (63.1 - 69.3)	64.1 (59.8 - 68.2)	68.5 (63.7 - 72.9)	4.4	68.8 (65.2 - 72.2)	64.6 (59.6 - 69.3)	72.6 (67.2 - 77.4)	8.0
St. Lucia	68.7 (65.7 - 71.7)	68.4 (64.3 - 72.3)	69.1 (64.5 - 73.4)	0.7	72.0 (68.8 - 75.0)	68.7 (64.0 - 73.1)	75.6 (71.2 - 79.5)	6.9
St. Vincent and the Grenadines	67.7 (63.5 - 71.5)	59.6 (53.8 - 65.2)	77.1 (71.4 - 82.0)	17.5	68.7 (66.0 - 71.3)	63.7 (59.9 - 67.4)	73.7 (69.9 - 77.2)	10.0
Suriname	65.2 (62.1 - 68.2)	65.1 (61.0 - 69.0)	65.4 (60.4 - 70.0)	0.3	66.1 (63.0 - 69.1)	66.0 (61.4 - 70.2)	66.2 (62.0 - 70.2)	0.2
Trinidad and Tobago	73.0 (70.6 - 75.2)	75.1 (72.0 - 77.9)	70.5 (66.8 - 74.0)	-4.6	73.4 (70.6 - 75.9)	69.8 (65.9 - 73.4)	77.0 (73.2 - 80.5)	7.2
Uruguay	80.9 (78.9 - 82.8)	75.6 (72.6 - 78.3)	87.4 (84.9 - 89.5)	11.8	77.2 (75.0 - 79.2)	69.3 (66.0 - 72.3)	86.4 (83.6 - 88.8)	17.1
Venezuela	60.7 (58.9 - 62.5)	56.8 (54.4 - 59.2)	65.2 (62.4 - 67.9)	8.4	65.2 (61.2 - 69.0)	53.3 (47.6 - 58.9)	75.2 (69.7 - 80.1)	21.9
Middle East & North Africa								
Algeria	86.7 (84.9 - 88.3)	85.1 (82.6 - 87.3)	88.7 (86.1 - 90.9)	3.6	88.5 (86.8 - 90.0)	86.2 (83.5 - 88.5)	90.5 (88.3 - 92.4)	4.3

Bahrain	79.5 (78.0 - 80.9)	78.5 (76.3 - 80.5)	80.6 (78.5 - 82.5)	2.1	75.1 (73.3 - 76.9)	71.9 (69.2 - 74.4)	78.2 (75.7 - 80.6)	6.3
Djibouti	71.9 (67.7 - 75.7)	69.3 (62.8 - 75.0)	73.8 (68.3 - 78.7)	4.5	71.7 (69.0 - 74.2)	64.8 (60.6 - 68.9)	76.0 (72.7 - 79.1)	11.2
Egypt	71.0 (68.9 - 73.0)	57.7 (54.6 - 60.7)	86.1 (83.6 - 88.2)	28.4	71.2 (67.0 - 75.0)	56.0 (49.3 - 62.5)	80.5 (75.6 - 84.7)	24.5
Iraq	64.8 (61.8 - 67.7)	58.7 (54.2 - 63.0)	70.3 (66.3 - 74.0)	11.6	61.0 (57.7 - 64.2)	50.7 (45.5 - 55.9)	67.2 (63.0 - 71.1)	16.5
Israel	87.6 (86.3 - 88.8)	85.2 (83.3 - 87.0)	90.3 (88.6 - 91.8)	5.1	78.1 (76.3 - 79.9)	72.6 (69.9 - 75.1)	84.5 (82.1 - 86.7)	11.9
Jordan	69.2 (65.9 - 72.3)	67.9 (63.0 - 72.5)	70.7 (66.3 - 74.7)	2.8	67.8 (65.1 - 70.3)	62.6 (58.4 - 66.6)	72.5 (69.1 - 75.6)	9.9
Kuwait	80.2 (77.9 - 82.4)	78.4 (75.2 - 81.3)	82.1 (78.6 - 85.2)	3.7	75.0 (73.0 - 76.9)	72.8 (69.8 - 75.5)	77.1 (74.3 - 79.7)	4.3
Lebanon	77.5 (75.5 - 79.3)	73.4 (70.7 - 76.0)	82.3 (79.5 - 84.8)	8.9	69.5 (67.5 - 71.4)	62.6 (59.8 - 65.3)	77.6 (74.8 - 80.2)	15.0
Libya	64.5 (62.0 - 67.0)	57.7 (54.5 - 60.9)	72.5 (68.6 - 76.1)	14.8	65.4 (61.7 - 68.9)	53.2 (47.6 - 58.6)	74.1 (69.2 - 78.4)	20.9
Malta	95.4 (94.2 - 96.4)	94.9 (93.0 - 96.3)	95.9 (94.2 - 97.1)	1.0	87.2 (84.6 - 89.5)	83.6 (79.4 - 87.0)	91.1 (87.6 - 93.6)	7.5
Morocco	74.9 (73.1 - 76.7)	75.0 (72.4 - 77.4)	74.9 (72.2 - 77.3)	-0.1	79.7 (78.1 - 81.1)	76.3 (73.8 - 78.6)	82.2 (80.2 - 84.1)	5.9
Oman	74.4 (71.4 - 77.1)	72.3 (68.5 - 75.9)	77.3 (72.4 - 81.5)	5.0	71.0 (69.2 - 72.8)	67.9 (65.1 - 70.5)	73.8 (71.3 - 76.2)	5.9
Qatar	68.3 (66.0 - 70.6)	65.5 (62.3 - 68.6)	72.1 (68.5 - 75.5)	6.6	70.1 (64.5 - 75.1)	63.5 (53.3 - 72.6)	72.8 (66.1 - 78.7)	9.3
Syria	63.7 (61.6 - 65.7)	59.5 (56.8 - 62.2)	67.8 (64.7 - 70.8)	8.3	68.9 (65.1 - 72.5)	60.5 (55.7 - 65.1)	75.8 (70.1 - 80.7)	15.3
Tunisia	76.1 (74.1 - 78.0)	68.9 (66.0 - 71.6)	83.8 (81.2 - 86.1)	14.9	74.1 (71.1 - 77.0)	63.9 (59.1 - 68.4)	82.8 (79.1 - 86.1)	18.9
United Arab Emirates	80.3 (78.5 - 81.9)	80.5 (78.0 - 82.8)	80.0 (77.3 - 82.4)	-0.5	78.1 (76.6 - 79.6)	75.8 (73.6 - 77.9)	80.4 (78.3 - 82.4)	4.6
Yemen	62.1 (59.1 - 65.1)	52.9 (48.5 - 57.3)	69.4 (65.3 - 73.3)	16.5	61.6 (58.8 - 64.4)	53.9 (50.1 - 57.7)	68.1 (63.9 - 72.0)	14.2
North America								
Canada	97.4 (96.8 - 97.9)	97.1 (96.3 - 97.8)	97.7 (96.9 - 98.3)	0.6	95.6 (94.7 - 96.3)	94.4 (92.9 - 95.5)	96.7 (95.5 - 97.6)	2.3
United States	94.4 (93.6 - 95.0)	93.9 (92.8 - 94.9)	94.8 (93.8 - 95.6)	0.9	91.9 (90.6 - 93.0)	88.5 (86.3 - 90.3)	95.2 (93.7 - 96.4)	6.7
South Asia								
Afghanistan	69.2 (65.9 - 72.3)	64.5 (60.6 - 68.2)	73.4 (68.2 - 78.1)	8.9	73.3 (70.8 - 75.7)	66.6 (62.9 - 70.0)	78.5 (75.0 - 81.6)	11.9
Bangladesh	71.3 (68.4 - 74.1)	67.2 (63.9 - 70.4)	73.7 (69.4 - 77.6)	6.5	83.0 (79.7 - 85.8)	73.4 (68.2 - 77.9)	87.1 (82.8 - 90.4)	13.7
Bhutan	70.6 (68.5 - 72.5)	70.3 (67.6 - 72.9)	70.9 (67.6 - 73.9)	0.6	75.4 (74.2 - 76.5)	70.5 (68.7 - 72.1)	80.4 (78.8 - 81.9)	9.9
India	75.2 (73.8 - 76.5)	73.9 (71.8 - 75.8)	76.3 (74.4 - 78.1)	2.4	76.1 (74.2 - 77.8)	74.6 (71.6 - 77.5)	76.9 (74.6 - 79.2)	2.3
Maldives	59.8 (56.5 - 63.1)	55.4 (51.0 - 59.7)	65.2 (60.2 - 69.9)	9.8	56.4 (53.9 - 58.8)	48.4 (45.1 - 51.7)	64.1 (60.5 - 67.5)	15.7
Nepal	46.1 (44.0 - 48.2)	42.4 (39.6 - 45.3)	50.3 (47.2 - 53.4)	7.9	55.6 (53.4 - 57.7)	50.3 (47.3 - 53.4)	60.5 (57.5 - 63.4)	10.2
Pakistan	50.7 (48.8 - 52.7)	41.9 (38.3 - 45.6)	56.8 (54.7 - 58.9)	14.9	54.9 (52.5 - 57.2)	49.7 (45.2 - 54.3)	57.6 (55.0 - 60.2)	7.9
Sri Lanka	85.9 (84.0 - 87.6)	87.5 (85.0 - 89.6)	84.3 (81.3 - 86.9)	-3.2	77.8 (75.7 - 79.8)	76.3 (73.5 - 79.0)	79.4 (76.3 - 82.2)	3.1
Sub-Saharan Africa								
Benin	91.8 (88.4 - 94.2)	87.7 (82.5 - 91.5)	93.9 (89.0 - 96.7)	6.2	90.9 (89.5 - 92.1)	86.5 (84.1 - 88.5)	92.5 (90.8 - 93.9)	6.0
Botswana	53.6 (49.8 - 57.3)	49.5 (44.7 - 54.3)	59.1 (53.0 - 64.8)	9.6	62.3 (59.7 - 64.8)	62.9 (59.3 - 66.3)	61.8 (58.0 - 65.4)	-1.1
Ghana	70.3 (68.3 - 72.1)	67.5 (64.8 - 70.2)	73.1 (70.2 - 75.7)	5.6	73.3 (71.5 - 75.0)	74.4 (71.8 - 76.9)	72.4 (70.0 - 74.8)	-2.0
Kenya	73.1 (70.9 - 75.2)	69.1 (66.0 - 72.0)	77.8 (74.7 - 80.7)	8.7	72.8 (70.3 - 75.1)	70.9 (67.2 - 74.3)	74.5 (71.2 - 77.6)	3.6
Liberia	56.5 (50.8 - 62.0)	53.0 (45.5 - 60.4)	60.4 (51.8 - 68.4)	7.4	65.3 (63.0 - 67.5)	59.5 (56.0 - 62.8)	70.6 (67.4 - 73.6)	11.1
Mauritania	58.6 (54.7 - 62.3)	51.9 (46.6 - 57.1)	64.0 (58.6 - 69.2)	12.1	60.1 (57.3 - 62.9)	50.9 (47.0 - 54.7)	68.1 (64.0 - 71.9)	17.2
Mauritius	75.7 (73.1 - 78.2)	71.1 (66.9 - 74.9)	81.0 (77.8 - 83.9)	9.9	78.0 (75.7 - 80.1)	73.5 (70.3 - 76.5)	83.1 (80.0 - 85.9)	9.6
Mozambique	73.0 (67.4 - 78.0)	66.6 (58.1 - 74.1)	80.2 (72.9 - 86.0)	13.6	81.7 (79.3 - 84.0)	76.6 (72.4 - 80.3)	85.9 (82.9 - 88.4)	9.3
Namibia	52.5 (49.4 - 55.5)	51.7 (47.8 - 55.5)	53.7 (48.8 - 58.5)	2.0	66.3 (64.6 - 67.9)	64.9 (62.4 - 67.2)	67.7 (65.4 - 70.0)	2.8
Senegal	66.7 (64.3 - 69.0)	58.3 (54.6 - 61.9)	72.5 (69.4 - 75.4)	14.2	74.0 (71.1 - 76.6)	63.6 (58.8 - 68.2)	80.8 (77.4 - 83.8)	17.2
Seychelles	67.3 (64.9 - 69.7)	67.8 (64.5 - 70.9)	66.8 (63.2 - 70.3)	-1.0	71.0 (67.9 - 74.0)	66.9 (62.4 - 71.0)	75.1 (70.7 - 79.1)	8.2
Sierra Leone	73.2 (69.8 - 76.3)	72.4 (67.8 - 76.5)	74.0 (69.0 - 78.5)	1.6	74.9 (72.5 - 77.2)	73.0 (69.6 - 76.1)	76.6 (73.1 - 79.7)	3.6
Sudan	67.4 (63.2 - 71.2)	62.6 (57.9 - 67.1)	71.6 (64.8 - 77.5)	9.0	70.6 (67.7 - 73.3)	64.9 (61.2 - 68.3)	75.7 (71.3 - 79.7)	10.8
Tanzania	70.7 (68.6 - 72.8)	68.7 (65.9 - 71.5)	73.3 (70.1 - 76.3)	4.6	75.1 (72.7 - 77.3)	70.3 (66.6 - 73.9)	78.6 (75.6 - 81.4)	8.3
Uganda	69.4 (66.2 - 72.4)	68.3 (63.9 - 72.4)	70.7 (66.0 - 74.9)	2.4	74.7 (72.6 - 76.6)	70.1 (66.9 - 73.1)	78.6 (75.9 - 81.0)	8.5
Zambia	63.3 (59.5 - 67.0)	65.0 (60.2 - 69.4)	61.4 (55.1 - 67.3)	-3.6	64.5 (61.3 - 67.5)	63.7 (59.1 - 68.0)	65.0 (60.6 - 69.1)	1.3
Zimbabwe	58.9 (56.7 - 61.2)	59.7 (56.8 - 62.5)	58.1 (54.4 - 61.7)	-1.6	62.1 (60.2 - 63.9)	59.9 (57.3 - 62.4)	64.0 (61.3 - 66.6)	4.1

Table S3A. Gender x age interactions in the association with ≥60 minutes of MVPA one or more days per week among adolescents.

Gender + age group	Stratified PR (95% CI)	Multiplicative PR (95% CI)
Girls + <14y	Ref	Ref
Girls + ≥14y	0.95 (0.93 – 0.98)	-
Boys + <14y	1.11 (1.09 – 1.13)	-
Boys + ≥14y	1.13 (1.10 – 1.15)	1.06 (1.03 - 1.10)

Abbreviations: 95%CI = 95% confidence interval; MVPA = moderate-to-vigorous physical activity; PR = prevalence ratio.

Table S4A - Relative difference in the prevalence of ≥60 minutes of MVPA one or more days per week between boys and girls by country/territory (n = 707,616).

Country	≤14 years old	>14 years old
	PR (CI95%)	PR (CI95%)
East Asia & Pacific		
Brunei	1.03 (0.98 - 1.08)	1.05 (1.00 - 1.10)
Cambodia	1.07 (0.95 - 1.19)	1.10 (1.02 - 1.18)
China	1.14 (1.10 - 1.18)	1.17 (1.10 - 1.25)
Cook Islands	0.86 (0.74 - 1.01)	0.99 (0.90 - 1.08)
Fiji	1.06 (0.97 - 1.15)	1.03 (0.98 - 1.08)
French Polynesia	1.00 (0.94 - 1.06)	1.04 (1.01 - 1.07)
Guam	1.05 (0.98 - 1.12)	1.04 (0.95 - 1.13)
Indonesia	1.02 (0.98 - 1.06)	1.06 (1.02 - 1.10)
Kiribati	1.16 (1.06 - 1.27)	1.18 (1.08 - 1.29)
Laos	1.03 (0.95 - 1.12)	1.25 (1.19 - 1.30)
Malaysia	0.99 (0.96 - 1.01)	1.05 (1.03 - 1.07)
Mongolia	1.01 (0.98 - 1.04)	1.06 (1.03 - 1.09)
Myanmar	1.02 (0.96 - 1.09)	1.30 (1.19 - 1.42)
Nauru	1.09 (0.81 - 1.48)	1.16 (0.92 - 1.46)
Niue	1.02 (0.70 - 1.49)	1.14 (0.82 - 1.57)
Northern Mariana Islands	1.04 (1.00 - 1.08)	1.16 (1.12 - 1.21)
Palau	0.97 (0.89 - 1.06)	1.02 (0.93 - 1.11)
Philippines	0.95 (0.89 - 1.01)	0.95 (0.90 - 1.00)
Samoa	0.93 (0.84 - 1.04)	0.92 (0.85 - 0.99)
Solomon Islands	0.89 (0.80 - 0.99)	1.00 (0.92 - 1.08)
Thailand	0.94 (0.88 - 1.00)	1.14 (1.07 - 1.22)
Timor-Leste	1.03 (0.95 - 1.13)	1.12 (1.07 - 1.18)
Tokelau	1.00 (0.69 - 1.44)	1.37 (1.03 - 1.82)
Tonga	0.99 (0.94 - 1.05)	1.07 (1.01 - 1.13)
Tuvalu	1.29 (1.07 - 1.55)	1.07 (0.91 - 1.26)
Vanuatu	0.97 (0.84 - 1.12)	0.98 (0.91 - 1.05)
Vietnam	1.09 (1.01 - 1.19)	1.20 (1.14 - 1.26)
Wallis and Futuna	1.01 (0.92 - 1.12)	1.07 (0.99 - 1.15)
Europe & Central Asia		
Albania	1.01 (1.00 - 1.02)	1.01 (0.99 - 1.03)
Armenia	1.02 (1.00 - 1.04)	1.02 (0.99 - 1.05)
Austria	1.00 (0.99 - 1.01)	1.01 (0.99 - 1.04)
Belgium	1.01 (1.00 - 1.02)	1.01 (0.99 - 1.02)
Bulgaria	1.00 (0.99 - 1.02)	1.04 (1.01 - 1.07)
Croatia	1.00 (0.99 - 1.01)	1.03 (1.01 - 1.05)
Czech Republic	0.99 (0.98 - 1.00)	1.02 (1.00 - 1.03)
Denmark	1.01 (0.99 - 1.02)	1.00 (0.98 - 1.03)
Estonia	1.00 (0.99 - 1.02)	1.01 (0.99 - 1.04)
Finland	0.99 (0.98 - 1.00)	0.99 (0.98 - 1.00)
France	1.00 (0.10 - 1.02)	1.03 (1.00 - 1.06)
Germany	0.99 (0.98 - 1.00)	1.01 (0.99 - 1.03)
Greece	1.01 (1.00 - 1.03)	1.06 (1.02 - 1.10)
Greenland	0.99 (0.94 - 1.05)	0.98 (0.91 - 1.06)
Hungary	1.01 (1.00 - 1.03)	1.01 (0.98 - 1.05)
Iceland	0.99 (0.98 - 1.00)	1.00 (0.99 - 1.02)
Ireland	0.99 (0.98 - 1.00)	1.00 (0.99 - 1.02)
Italy	1.04 (1.01 - 1.06)	1.09 (1.05 - 1.13)
Latvia	1.00 (0.99 - 1.02)	1.02 (1.00 - 1.04)
Lithuania	1.02 (1.00 - 1.03)	1.02 (1.00 - 1.05)
Luxembourg	1.01 (0.99 - 1.02)	1.02 (0.99 - 1.04)
Moldova	0.99 (0.98 - 1.01)	1.01 (0.99 - 1.03)
Netherlands	1.00 (0.99 - 1.01)	0.99 (0.96 - 1.01)
North Macedonia	1.00 (0.98 - 1.01)	1.05 (1.03 - 1.08)
Norway	0.99 (0.98 - 1.00)	0.99 (0.96 - 1.03)
Poland	1.01 (1.00 - 1.02)	1.03 (1.01 - 1.06)
Portugal	1.00 (0.99 - 1.01)	1.05 (1.03 - 1.08)
Romania	1.03 (1.01 - 1.05)	1.12 (1.07 - 1.17)
Russia	0.99 (0.97 - 1.00)	1.02 (1.00 - 1.05)
Slovakia	1.00 (0.99 - 1.01)	1.02 (1.00 - 1.04)
Slovenia	1.00 (0.99 - 1.01)	1.05 (1.03 - 1.07)
Spain	1.00 (0.99 - 1.01)	1.02 (1.01 - 1.03)
Sweden	0.99 (0.98 - 1.01)	1.00 (0.98 - 1.02)
Switzerland	1.01 (1.00 - 1.02)	1.00 (0.99 - 1.02)
Türkiye	1.01 (1.00 - 1.03)	1.11 (1.07 - 1.15)

Ukraine	1.01 (1.00 - 1.03)	1.00 (0.98 - 1.02)
United Kingdom	1.00 (0.99 - 1.00)	1.01 (0.99 - 1.02)
Latin America & Caribbean		
Anguilla	0.88 (0.76 - 1.02)	1.05 (0.95 - 1.18)
Antigua and Barbuda	1.09 (0.98 - 1.21)	1.01 (0.88 - 1.15)
Argentina	1.05 (1.02 - 1.07)	1.13 (1.11 - 1.16)
Bahamas	1.05 (0.97 - 1.14)	1.24 (0.99 - 1.56)
Barbados	1.02 (0.94 - 1.11)	1.08 (0.96 - 1.20)
Belize	1.06 (0.98 - 1.15)	1.09 (1.00 - 1.09)
Bolivia	1.02 (0.97 - 1.08)	1.10 (1.07 - 1.14)
Brazil	1.29 (1.24 - 1.34)	1.64 (1.55 - 1.74)
British Virgin Islands	1.06 (0.97 - 1.16)	1.11 (1.01 - 1.23)
Cayman Islands	1.08 (1.00 - 1.70)	1.07 (0.97 - 1.07)
Chile	1.12 (1.06 - 1.19)	1.10 (1.03 - 1.18)
Colombia	1.02 (1.00 - 1.04)	1.09 (1.08 - 1.11)
Costa Rica	1.05 (1.00 - 1.10)	1.11 (1.04 - 1.18)
Curaçao	1.06 (0.97 - 1.16)	1.16 (1.09 - 1.25)
Dominica	1.03 (0.94 - 1.13)	1.09 (0.96 - 1.23)
Dominican Republic	1.06 (0.91 - 1.22)	1.20 (1.07 - 1.33)
Ecuador	1.22 (1.16 - 1.28)	1.57 (1.45 - 1.70)
El Salvador	1.02 (0.93 - 1.12)	1.13 (1.03 - 1.24)
Grenada	1.02 (0.91 - 1.13)	1.09 (0.93 - 1.27)
Guatemala	1.02 (0.91 - 1.14)	1.09 (0.97 - 1.22)
Guyana	1.06 (0.96 - 1.18)	1.19 (1.07 - 1.31)
Honduras	1.19 (1.09 - 1.29)	1.21 (1.09 - 1.33)
Jamaica	1.01 (0.92 - 1.12)	0.99 (0.90 - 1.08)
Mexico	1.10 (1.02 - 1.28)	1.13 (1.01 - 1.27)
Monserrat	0.89 (0.68 - 1.17)	1.02 (0.82 - 1.26)
Panama	1.09 (1.02 - 1.17)	1.21 (1.15 - 1.27)
Paraguay	1.12 (1.05 - 1.19)	1.19 (1.13 - 1.26)
Peru	0.96 (0.91 - 1.01)	1.03 (0.98 - 1.09)
Puerto Rico	1.05 (0.85 - 1.29)	1.23 (1.15 - 1.33)
St. Kitts and Nevis	1.07 (0.97 - 1.17)	1.12 (1.01 - 1.25)
St. Lucia	1.01 (0.92 - 1.10)	1.10 (1.01 - 1.20)
St. Vincent and the Grenadines	1.29 (1.15 - 1.46)	1.16 (1.07 - 1.25)
Suriname	1.00 (0.91 - 1.11)	1.00 (0.92 - 1.10)
Trinidad and Tobago	0.94 (0.88 - 1.00)	1.10 (1.03 - 1.19)
Uruguay	1.16 (1.10 - 1.21)	1.25 (1.18 - 1.32)
Venezuela	1.15 (1.08 - 1.22)	1.41 (1.24 - 1.60)
Middle East & North Africa		
Algeria	1.04 (1.00 - 1.08)	1.05 (1.01 - 1.09)
Bahrain	1.03 (0.99 - 1.07)	1.09 (1.04 - 1.14)
Djibouti	1.07 (0.95 - 1.19)	1.17 (1.09 - 1.27)
Egypt	1.49 (1.41 - 1.58)	1.44 (1.26 - 1.64)
Iraq	1.20 (1.09 - 1.32)	1.32 (1.18 - 1.49)
Israel	1.06 (1.03 - 1.09)	1.17 (1.11 - 1.22)
Jordan	1.04 (0.95 - 1.14)	1.16 (1.07 - 1.25)
Kuwait	1.05 (0.99 - 1.11)	1.06 (1.01 - 1.12)
Lebanon	1.12 (1.07 - 1.18)	1.24 (1.17 - 1.31)
Libya	1.26 (1.16 - 1.36)	1.39 (1.23 - 1.57)
Malta	1.01 (0.99 - 1.03)	1.09 (1.03 - 1.15)
Morocco	1.00 (0.95 - 1.05)	1.08 (1.04 - 1.12)
Oman	1.07 (0.99 - 1.16)	1.09 (1.03 - 1.15)
Qatar	1.10 (1.03 - 1.18)	1.15 (0.96 - 1.37)
Syria	1.14 (1.07 - 1.22)	1.25 (1.13 - 1.39)
Tunisia	1.22 (1.16 - 1.28)	1.30 (1.19 - 1.41)
United Arab Emirates	0.99 (0.95 - 1.04)	1.06 (1.02 - 1.10)
Yemen	1.31 (1.19 - 1.45)	1.26 (1.15 - 1.39)
North America		
Canada	1.01 (1.00 - 1.02)	1.03 (1.01 - 1.04)
United States	1.01 (0.99 - 1.02)	1.08 (1.05 - 1.11)
South Asia		
Afghanistan	1.14 (1.04 - 1.25)	1.18 (1.10 - 1.26)
Bangladesh	1.10 (1.02 - 1.18)	1.19 (1.10 - 1.28)
Bhutan	1.01 (0.95 - 1.07)	1.14 (1.11 - 1.18)
India	1.03 (1.00 - 1.07)	1.03 (0.98 - 1.08)
Maldives	1.18 (1.06 - 1.31)	1.32 (1.21 - 1.45)
Nepal	1.19 (1.08 - 1.30)	1.20 (1.11 - 1.30)
Pakistan	1.36 (1.23 - 1.49)	1.16 (1.05 - 1.28)
Sri Lanka	0.96 (0.92 - 1.01)	1.04 (0.99 - 1.10)
Sub-Saharan Africa		

Benin	1.07 (1.00 - 1.14)	1.07 (1.04 - 1.10)
Botswana	1.19 (1.04 - 1.37)	0.98 (0.90 - 1.07)
Ghana	1.08 (1.02 - 1.14)	0.97 (0.93 - 1.02)
Kenya	1.13 (1.06 - 1.19)	1.05 (0.98 - 1.12)
Liberia	1.14 (0.93 - 1.39)	1.19 (1.10 - 1.28)
Mauritania	1.23 (1.08 - 1.41)	1.34 (1.22 - 1.47)
Mauritius	1.14 (1.06 - 1.22)	1.13 (1.07 - 1.19)
Mozambique	1.21 (1.04 - 1.40)	1.12 (1.06 - 1.19)
Namibia	1.04 (0.92 - 1.17)	1.04 (0.99 - 1.10)
Senegal	1.24 (1.15 - 1.34)	1.27 (1.17 - 1.38)
Seychelles	0.99 (0.92 - 1.06)	1.12 (1.03 - 1.22)
Sierra Leone	1.02 (0.94 - 1.12)	1.05 (0.99 - 1.12)
Sudan	1.14 (1.02 - 1.28)	1.17 (1.08 - 1.26)
Tanzania	1.07 (1.01 - 1.13)	1.12 (1.05 - 1.19)
Uganda	1.04 (0.95 - 1.13)	1.12 (1.06 - 1.18)
Zambia	0.94 (0.84 - 1.07)	1.02 (0.93 - 1.12)
Zimbabwe	0.97 (0.90 - 1.05)	1.07 (1.01 - 1.13)

Note: Girls were the reference group.

Abbreviations: 95%CI = 95% confidence interval; MVPA = moderate-to-vigorous physical activity; PR = prevalence ratio.

Artigo 3

Macroeconomic and social indicators are associated with prevalence and gender inequalities in physical activity among adolescents: a global perspective

Abstract: We aimed to analyze the association of the macroeconomic and social indicators with the prevalence and gender inequalities in some moderate-to-vigorous physical activity (MVPA) and compliance with physical activity (PA) guidelines among adolescents.

Methods: This ecological study used data from 135 countries collected between 2003 and 2019. The weekly frequency of days with ≥60 min/day of MVPA was self-reported and the Human Development Index (HDI), Gender Inequality Index (GII), and GINI coefficient were retrieved from the Human Development Report and the World Bank Website. Absolute gender differences (boys *vs.* girls) were obtained from the weighted prevalence of some MVPA (≥1 day/week of at least 60 min/day of MVPA) and compliance with PA guidelines. The Spearman correlation was used to identify correlations between country-context variables and MVPA.

Results: The prevalence of some MVPA and compliance with PA guidelines increased with increments in HDI (low HDI: 69.0% *vs.* very high HDI: 90.0%, and low HDI: 14.0% *vs.* very high HDI: 18.0%, respectively) and reductions in GII (tertile 3: 69.0% *vs.* tertile 1: 94.0%, and tertile 3: 15.0% *vs.* tertile 1: 19.0%, respectively) and GINI (tertile 3: 74.0% vs. tertile 1: 87.0%, and tertile 3: 15.0% vs. tertile 1: 19.0%, respectively). However, while countries with lower HDI and higher GII and GINI coefficients presented higher gender inequalities in some MVPA, higher gender inequalities in compliance with PA guidelines were observed among countries with higher HDI and lower GII. Sensitivity analyses revealed that while associations between country-context variables and some MVPA tended to be consistent after stratification by income, associations with PA compliance remained consistent only in the Global South.

Conclusion: While better macroeconomic and social indicators are generally related to higher MVPA, their relationship with gender inequalities is inconsistent, showing opposing trends for some MVPA and adherence to MVPA guidelines.

Keywords: Global School-based Student Health Survey; Health Behavior Among School-aged Children; Inequality; Surveillance; Youth

Background

Moderate-to-vigorous physical activity (MVPA) practice during adolescence is a protective factor for several health outcomes (e.g., metabolic risk, cognitive development, and mental health-related outcomes),[1,2] with evidence indicating a moderate tracking of MVPA from adolescence to adulthood.[3] Therefore, MVPA during adolescence can be associated directly and indirectly with health outcomes during adulthood.[4] Also, adolescents engaged in the contextualized practice of physical activity, especially during leisure and school time, might find opportunities for social interaction with peers and to make friends.[5] Thus, the World Health Organization recommends that adolescents have a daily average of at least 60 minutes of MVPA.[6]

However, taking into account that benefits can be reached even for those who are below the physical activity guidelines,[7–9] a recent approach has drawn attention to the importance of analyzing prevalence and trends in physical activity using complementary thresholds, such as those based on 'no or low MVPA', coding the participants into groups with 'no or low MVPA' (e.g., zero days/week of at least 60 min/day of MVPA) and 'some MVPA' (e.g., one or more days/week of at least 60 min/day of MVPA).[10]

Furthermore, previous findings showed that only 19% of adolescents achieve the physical activity guidelines, with boys being constantly more active than girls.[11] Using some MVPA as the outcome, a study showed that almost 80% of the adolescents reported one or more days/week of at least 60 min/day of MVPA, where boys tend to be more active than girls, but with gender inequalities concentrated among countries/territories of the Global South.[12] Although the findings from both thresholds are in the same direction, inequalities in some MVPA are closer to access/opportunities to physical activity practice, while compliance with physical activity guidelines is closer to the ideal scenario of physical activity practice.[10]

Concerning the factors behind the participation in physical activity, a complex chain of correlates/determinants could shape this behavior, which is organized in different levels (e.g., intrapersonal, interpersonal, cultural, environmental, and political).[13] In addition, country characteristics could positively or negatively influence this chain. For instance, adolescents living in countries with a higher Human Development Index (HDI), an indicator obtained from dimensions of health, education, and standard of living, might find more availability of physical activity facilities (e.g., parks, sidewalks), better street connections, and lower crime rates and higher security perception, as well as more

availability of public policies for physical activity promotion, which could affect positively the physical activity practice.[14]

In addition, studies have shown that gender inequalities in physical activity start early in life, with roots in social and gender norms.[15] Thus, the scientific community has sought to understand associations between social indicators and physical activity among girls/women and boys/men. Using the Gender Inequality Index (GII), an indicator based on reproductive health, empowerment, and the labor force, previous findings reveal favorable scenarios among countries with lower GII,[16] which can reflect scenarios with more liberty, autonomy, and safety for women in different aspects of life,[17] including those related to physical activity practice.

Another important issue in investigating socioeconomic aspects and physical activity lies in understanding the role of income distribution in shaping this behavior. Using the GINI coefficient as an exposure, previous studies have shown detrimental effects of income inequalities on physical activity,[18] which could be related to unfavorable life conditions, such as living at places with poor infrastructures for physical activity practice and struggling with higher relative fees to access private physical activity facilities.

Although previous studies investigated the association between country context variables and physical activity among adolescents, some gaps remain in the literature and further research is needed. For instance, investigating countries from the Global South, Ricardo et al.[19] identified that those with lower GII and higher HDI and Gross Domestic Product (GDP) had higher gender inequalities in physical activity prevalence. In contrast, de Looze,[20] using data from Global North, identified larger gaps in countries with higher GII. In addition, both studies[19,20] used the physical activity prevalence (compliance with physical activity guidelines) as the outcome, and we are not aware of a previous study that investigated the association between country context variables and physical activity among adolescents from the perspective of those with ‘some MVPA’.

Furthermore, harmonizing and analyzing available national data could provide insights into how country context characteristics could be behind the prevalence and inequalities in MVPA, providing information to formulate global and national agendas for physical activity promotion. Thus, the present study aimed to analyze the association of country context variables with prevalence and inequalities in MVPA among adolescents, using outcomes related to some MVPA and compliance with physical activity guidelines.

Methods

Study design and sample

This is an ecological study with data from different regions (East Asia & the Pacific, Europe & Central Asia, Latin America & the Caribbean, the Middle East & North Africa, North America, South Asia, and Sub-Saharan Africa). Firstly, we included data from GSHS and HBSC. Both GSHS and HBSC are school-based surveys conducted at the national level, which collect information by self-reported questionnaires. Microdata from these surveys are available on their respective websites.[21,22] For countries with no GSHS and HBSC data, we sought available data from personal networks and a literature review. We considered the latest survey for countries with more than one survey available. Data collection for the surveys included ranged from 2003 to 2019.

Our inclusion criteria were surveys with nationally representative or with a defined subnational population of countries or territories (throughout the paper, we will use 'countries' to refer to countries/territories), and surveys that included a question regarding the number of days the respondent was physically active for at least 60 min per day in the past 7 days.[11,12] Among the surveys assessed for eligibility (n = 147), 12 were excluded due to missing data for all country-context variables analyzed, totaling 135 surveys, composed of 705,389 adolescents with no missing information (Figure 1). Local ethics committees in each country previously approved the surveys. The data were anonymized, and informed consent was obtained from the students and/or parents/legal guardians, as required by local ethics review boards. Further details of the surveys analyzed are presented in Supplementary Table 1.

Physical activity

Both GSHS and HBSC assessed physical activity by the question: "During the past 7 days, on how many days were you physically active for a total of at least 60 min per day?". Country-specific examples of physical activity were used, such as running, dancing, and football. Possible responses ranged from zero to seven days, and the cut-off of one or more days of at least 60 min per day of MVPA was used to code those with "some MVPA", while the cut-off of 7 days per week was used to code those who achieve the physical activity guidelines. More details about dichotomization can be found in Supplementary Chart 1.

Gender and age

GSHS assessed information about gender through the question “What is your sex?” (male or female), while HBSC used “Are you a girl or a boy?” (boy or girl). In the present paper, the term gender is used since most evidence on physical activity inequalities between boys and girls has a social explanation, not a biological one.[19,23]

Information about age was assessed by GSHS using the question “How old are you?”, while HBSC used information about month and year of birth to calculate age.

Country-context variables

HDI was gathered from the Human Development Report (https://hdr.undp.org/). The HDI seeks to present an index for the achievement of key dimensions of human development. The HDI is calculated by three dimensions: health dimension, education dimension, and standard of living dimension, obtained by the gross national income *per capita*. The HDI ranges from 0 to 1, and the highest values present the highest achievement in the key dimensions.

GII was gathered from the Human Development Report (https://hdr.undp.org/). The GII is an index that seeks to present gender inequality. The GII uses three dimensions: reproductive health (maternal mortality ratio and adolescent birth rate), empowerment (female and male with at least secondary education, female and male shares of parliamentary seats), and the labor market (female and male labor force participation rates). The GII ranges from 0 to 1, and the highest values present the highest inequalities.

GINI was gathered from the World Bank Website (https://data.worldbank.org/). The GINI index seeks to present, through a scale from 0 to 1, the extent to which the distribution of income within an economy deviates from a perfectly equal distribution, with 0 representing an equal distribution.

When information about the country-context variable for the same year of the survey was not available, the data were imputed using information from the closer year or the median of the previous and subsequent years when the distance between the previous year and survey year and the subsequent year and survey year were the same (Supplementary Table 1). Three, 13, and 26 countries/territories had missing HDI, GII, and GINI information, respectively. More details on excluded surveys and the analytical sample size in each analysis can be found in Figure 1.

Statistics

The weighted country-level prevalence of some MVPA and compliance with physical activity guidelines were presented with their respective 95% confidence intervals (95%CI), and the command 'metaprop' was used to compute the harmonized weighted prevalence. Absolute gender differences (boys *vs.* girls) were obtained from the weighted prevalence of some MVPA and compliance with physical activity guidelines, which were presented using percentage points (p.p.).

For statical analysis, HDI was coded in low (<0.550, n = 16), medium (≥0.550 to <0.700, n = 30), high (≥ 0.700 to <0.800, n = 35), and very high (≥ 0.800, n = 51).[24] Both GII and GINI were coded based on tertiles, where GII (low: 0.018 to 0.248, n = 41; medium: 0.249 to 0.437, n = 41; high: 0.440 to 0.806, n = 40) and GINI (low: 0.246 to 0.329, n = 37; medium: 0.330 to 0.391, n = 37; high: 0.392 to 0.647, n = 36).

Spearman correlation coefficient was used to identify possible correlations between country context variables and MVPA, with a significance level of 5%. Sensitivity analyses were run to verify whether the correlations between exposure and outcome are consistent throughout different income classifications, using the World Bank criteria to code countries as Global South (low-, lower-middle, upper-middle-income countries) and Global North (high-income countries).[25] Venezuela, RB was not considered for sensitive analysis due to the unavailability of income data. Descriptive and analytical statistics were conducted in Stata 18.0 (StataCorp., College Station, TX, USA).

Results

This study included data from 135 countries (East Asia & the Pacific (n = 21), Europe & Central Asia (n = 40), Latin America & the Caribbean (n = 29), the Middle East & North Africa (n = 18), North America (n = 2), South Asia (n = 8), and Sub-Saharan Africa (n = 17). A higher prevalence of some MVPA was noticed among countries with higher HDI (Low HDI: 69.0% *vs.* Very high HDI: 90.0%), with the largest differences between bottom and top HDI classification among girls (Low HDI: 64.0% vs. Very high HDI: 89.0%) compared to boys (Low HDI: 73.0% *vs.* Very high HDI: 92.0%) (Table 1, Panel A). Concerning compliance with physical activity guidelines, although we also have noticed increases with increments in the HDI (Low HDI: 14.0% *vs.* Very high HDI: 18.0%), the largest increments were noticed among boys (Low HDI: 16.0% *vs.* Very high HDI: 22.0%) instead of among girls (Low HDI: 11.0% *vs.* Very high HDI: 14.0%) (Table 1, Panel A). However, while the gender inequalities in some MVPA were reduced with

increments in HDI, an opposite trend of noticed for compliance with physical activity guidelines, which was confirmed by Spearman's correlation coefficient (Table 2).

Both the prevalences of some MVPA (Tertile 3: 69.0% *vs.* Tertile 1: 94.0%) and compliance with physical activity guidelines (Tertile 3: 15.0% *vs.* Tertile 1: 19.0%) increased with reductions in the GII but with the largest increments in some MVPA among girls (Tertile 3: 65.0% vs. Tertile 1: 93.0%), while boys had the largest increases in the prevalence of compliance with the physical activity guidelines (Tertile 3: 18.0% vs. Tertile 1: 23.0%) (Table 1, Panel B). Also, there was a direct correlation between GII and the gender gap in some MVPA, while the gap for compliance with the guidelines was reduced with increments in GII (Table 2).

The prevalence of some MVPA presented increments across the Tertiles of GINI (Tertile 3: 74.0% vs. Tertile 1: 87.0%), with the largest increases among girls (Tertile 3: 71.0% vs. Tertile 1: 86.0%). When compliance with physical activity prevalence was the outcome, there was also an increase in the prevalence with reductions in GINI (Tertile 3: 15.0% vs. Tertile 1: 19.0%), but with similar values among boys and girls. Although Spearman's correlation coefficient confirmed the correlation of GINI with some MVPA and compliance with physical activity guidelines, a correlation with gender inequalities was noticed just for some MVPA (Table 2). Supplementary Table 2 presents the prevalence of some MVPA and compliance with physical activity guidelines, as well as their respective absolute gender difference at the country level.

We also carried out a sensitivity analysis to identify the associations of country context variables with prevalence and inequalities in MVPA according to country income (Table 2). When prevalence and inequalities in some MVPA were the outcomes, the associations tended to keep the trends observed in general analysis, except for the association between GINI and gender inequalities in some MVPA. On the other hand, when the prevalence and inequalities in MVPA were the outcomes, only the associations including countries from the Global South remained significant.

Discussion

Main findings

While the prevalence of some MVPA increased with increments in HDI and reductions in GII and GINI, the gap between boys and girls reduced as indicators became better; these findings tended to be consistent even after stratification by country income. Moreover, increments in HDI and reductions in GII and GINI increased the prevalence

of compliance with physical activity guidelines, but results remained consistent only among countries of the Global South. Gender inequalities in compliance with physical activity guidelines increased with increments in HDI and reduced with increments in GII, with significant results remaining only among countries of the Global South.

Countries with lower HDI and higher gender (GII) and income (GINI) inequalities presented a lower prevalence of some MVPA, regardless of the income classification. These results extend the literature presenting that country-context variables seem to be not only associated with the achievement of the international guidelines but also with an indicator closer to doing some MVPA.[26] Although intuitive, these findings reveal that countries with the worst social indicators face the challenge of promoting a large coverage of the minimum MVPA. Insights to explain discrepancies between countries can be found in previous studies, where adolescents living in less favorable social conditions often need to overcome different barriers to be active, such as lower availability of facilities for physical activity (eg., sidewalks, bike lanes, and parks), lower perception of a safe neighborhood, and lack of public policies for physical activity promotion.[14,27] In addition, in societies with a higher GII, cultural norms might restrict the girls' opportunities to participate in physical activities, such as engagement in sports.

Interestingly, our analysis revealed that increments in HDI and reductions in GII and GINI increased the prevalence of compliance with physical activity guidelines, but only among countries of the Global South. In general, high-income countries (criteria used to code countries as Global North) tend to present better indicators of HDI, GII, and GINI, and our analysis may be capturing a ceiling effect. Thereby, improvements in these indicators might be less noticeable in the Global North compared to the Global South. In addition, given the methodological limitations for analysis according to the physical activity domains, we could not describe the context where the MVPA has been practiced.[28] Thus, while our analysis presents initial descriptive findings, further research is needed to advance the knowledge of how social indicators shape physical activity among adolescents.

Furthermore, we sought to identify how the country-context variable is associated with gender inequalities. As far as we know, this is the first study using both approaches to investigate possible associations between country-context variables and MVPA from a global perspective, which could make comparisons hard.[19,20] Previous studies have reported gender inequalities starting at earlier ages and persisting until later.[15] Among adolescents, differences in physical activity between boys and girls are related to greater family and school support for participation in sports activities among boys, which

involves, for instance, parents watching their children being physically active.[29] On the other hand, social expectations, and gender norms direct girls to take on responsibilities for household chores, limiting their availability for engagement in other forms of physical activity, such as activity play.[30] Therefore, studying how country-context variables are associated with gender inequalities in physical activity allows raising possible explanations for these disparities, and identifying priorities for public policies.

Except for the lack of association between the GINI coefficient and some MVPA among countries of the Global South, our analysis revealed lower inequalities in some MVPA in scenarios of better social indicators, regardless of country income classification. Thus, as the prevalence of boys who report some MVPA is getting closer to the limit (100%) than those presented by girls, increases in the prevalence of some MVPA with improvements in social indicators among girls will result in reductions in gender inequalities in some MVPA. Therefore, other physical activity thresholds would be welcome to identify inequalities in bottom amounts of physical activity when greater coverage of some MVPA is guaranteed for boys and girls.[12]

Concerning gender inequalities in meeting physical activity guidelines, Spearman correlation coefficients revealed larger gaps between boys and girls when the HDI and GII were better, but with significant association only among countries of the Global South. Although our findings seem contradictory (e.g., increases in the gender gap in compliance with physical activity guidelines with a reduction in GII), we noticed that the increment in inequalities occurs in a scenario where the prevalence of compliance with guidelines increases for both girls and boys, but with gains greater among boys than among girls. While better social indicators could reflect improvements in overall participation in different types of physical activity, increasing the prevalence of compliance with physical activity guidelines, the more privileged groups could keep receiving more attention about physical activity practice, increasing the gap as a consequence, which is in line with the Inverse Equity Hypotheses.[31]

Implications

In this paper, we showed that it is important that monitoring of physical activity promotion be not based only on an indicator of physical activity (i.e., reaching or not the international guidelines), as it could hide important social inequalities in physical activity. Thus, we suggest that global physical activity targets, such as those proposed by the WHO, should consider not only the adherence to recommendations, but also address prior advancements, such as access to and opportunities for physical activity practice, and incorporate equity as a key indicator for global targets.

Strengths and limitations

Despite our effort to harmonize data from 135 countries/territories and the use of different thresholds to investigate prevalence and inequalities in physical activity, our study has several limitations that need to be acknowledged. Although we have analyzed gender inequalities, many other aspects shape the systems of power in today's societies, such as race and ethnicity, income, and education status – and studying the intersectional effects of these aspects is essential to capture the role picture of social inequalities in physical activity.[32] The ecologic design does not allow infer causality. The surveys analyzed ranged from 2003 to 2019, and our findings could not reflect the actual scenario of the country (e.g., the presence of internal/external conflicts, political instability, and climate changes). Therefore, the data used could not capture possible changes in physical activity due to the COVID-19 pandemic, which might not only reduce during this period, but the engagement in physical activity might be lower than that reported before the COVID-19 pandemic, with boys and girls being differently affected, which might even increase the gender inequalities observed.[33] Thus, we highlight the importance of further studies aiming to identify how the COVID-19 pandemic impacted the global physical activity prevalence and inequalities. Even considering the use of data from several countries, there were countries where we could not gather information, which might affect the regional and global representation. In addition, estimates from China, the UK, Venezuela, and Zimbabwe had no national representativeness. Although the number of days per week of at least 60 minutes per day of MVPA has been largely used in physical activity surveillance, global psychometric properties of this question were not available.[34] Moreover, as information on the physical activity domains was not available, it was not possible to raise a discussion on how different contexts contribute to the weekly time spent in MVPA,[28] and how it might differ between countries/regions.[35] Although WHO physical activity recommendations highlight the importance of performing muscle and bone-strengthening activities,[36] the GSHS does not use specific questions to assess participation in these activities in the core questionnaire. Finally, since HDI and GII presented a high correlation (r = -0.916), interpretations of our findings must bear in mind that there may exist an overlapped effect of exposures on the outcome.

Conclusions

Prevalence of some MVPA and compliance with physical activity guidelines increased with increments in HDI and reduction in GII and GINI, indicating that the inequalities in physical activity are not restricted to the top amounts of physical activity

but happen at the bottom. Associations between country-context variables and some MVPA tended to be consistent even after stratification by income, while the association between HDI and GII with PA compliments was noticed only in the Global South, indicating a possible ceiling effect. In addition, opposite directions were observed for gender inequalities in physical activity, with countries with higher HDI and lower GII presenting larger gender gaps in compliance with physical activity – which was driven by the higher increases in physical activity among boys.

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Table 1 - Prevalence and absolute gender difference in some moderate-to-vigorous physical activity and compliance with physical activity guidelines according to the HDI classification, and tertiles of GII and GINI.

Country-context variables	Some MVPA[a]				Compliance with MVPA guidelines[b]			
	All % (95% CI)	Girls % (95% CI)	Boys % (95% CI)	Gap[c]	All % (95% CI)	Girls % (95% CI)	Boys % (95% CI)	Gap[c]
Panel A								
HDI[d] (n = 132)								
Low	69.0 (64.0 - 75.0)	64.0 (59.0 - 70.0)	73.0 (67.0 - 79.0)	9.0	14.0 (12.0 - 16.0)	11.0 (9.0 - 13.0)	16.0 (13.0 - 19.0)	5.0
Medium	67.0 (65.0 - 70.0)	64.0 (61.0 - 66.0)	71.0 (67.0 - 74.0)	7.0	15.0 (12.0 - 18.0)	13.0 (11.0 - 16.0)	17.0 (14.0 - 21.0)	4.0
High	77.0 (73.0 - 80.0)	74.0 (69.0 - 79.0)	79.0 (78.0 - 81.0)	5.0	18.0 (16.0 - 19.0)	14.0 (13.0 - 15.0)	22.0 (20.0 - 23.0)	8.0
Very high	90.0 (89.0 - 92.0)	89.0 (87.0 - 92.0)	92.0 (90.0 - 93.0)	3.0	18.0 (17.0 - 19.0)	14.0 (13.0 - 15.0)	22.0 (21.0 - 23.0)	8.0
Gap (Very high *vs.* Low)	21.0	25.0	19.0		4.0	3.0	6.0	
Panel B								
GII[e] (n = 122)								
Tertile 1	94.0 (89.0 - 98.0)	93.0 (88.0 - 98.0)	94.0 (90.0 - 98.0)	1.0	19.0 (17.0 - 21.0)	15.0 (14.0 - 16.0)	23.0 (21.0 - 25.0)	8.0
Tertile 2	76.0 (73.0 - 79.0)	73.0 (69.0 - 77.0)	79.0 (77.0 - 82.0)	6.0	17.0 (15.0 - 18.0)	13.0 (12.0 - 15.0)	21.0 (19.0 - 22.0)	8.0
Tertile 3	69.0 (66.0 - 72.0)	65.0 (62.0 - 68.0)	73.0 (70.0 - 76.0)	8.0	15.0 (13.0 - 17.0)	12.0 (10.0 - 14.0)	18.0 (15.0 - 20.0)	6.0
Gap (Tertile 1 *vs.* Tertile 3)	25.0	28.0	21.0		4.00	3.00	5.00	
Panel C								
GINI (n = 110)								
Tertile 1	87.0 (84.0 - 90.0)	86.0 (82.0 - 89.0)	89.0 (86.0 - 92.0)	3.0	19.0 (15.0 - 22.0)	15.0 (12.0 - 18.0)	22.0 (18.0 - 26.0)	7.0
Tertile 2	79.0 (78.0 - 81.0)	77.0 (74.0 - 79.0)	82.0 (81.0 - 84.0)	5.0	17.0 (15.0 - 19.0)	13.0 (12.0 - 15.0)	21.0 (19.0 - 22.0)	8.0
Tertile 3	74.0 (71.0 - 78.0)	71.0 (66.0 - 75.0)	77.0 (74.0 - 81.0)	6.0	15.0 (14.0 - 17.0)	13.0 (12.0 - 14.0)	19.0 (17.0 - 20.0)	6.0
Gap (Tertile 1 *vs.* Tertile 3)	13.0	15.0	12.0		4.0	2.0	3.0	

Note: [a]one or more days/week of at least 60 min/day of MVPA; [b]seven days/week of at least 60 min/day of MVPA.[c]Boys *vs.* girls. [d]Human Development Index; [e]Gender Inequality Index. The gap is expressed in percentage points.

Table 2 - Correlations of country-context variables with moderate-to-vigorous physical activity among adolescents.

	Some MVPA		Physical activity guidelines	
	Prevalence	Gender inequalities	Prevalence	Gender inequalities
HDI				
All (n = 132)	0.741*	-0.511*	0.346*	0.360*
Global South (n = 80)	0.520*	-0.256*	0.420*	0.421*
Global North (n = 51)	0.716*	-0.538*	-0.004	-0.036
GII				
All (n = 122)	-0.788*	0.582*	-0.391*	-0.298*
Global South (n = 74)	-0.516*	0.307*	-0.465*	-0.350*
Global North (n = 47)	-0.682*	0.580*	-0.074	0.138
GINI				
All (n = 110)	-0.497*	0.372*	-0.289*	-0.106
Global South (n = 70)	-0.219	0.066	-0.237*	-0.118
Global North (n = 39)	-0.342*	0.407*	-0.283	0.076

Note: Venezuela, RB was not considered for sensitive analysis due to the unavailability of income data.

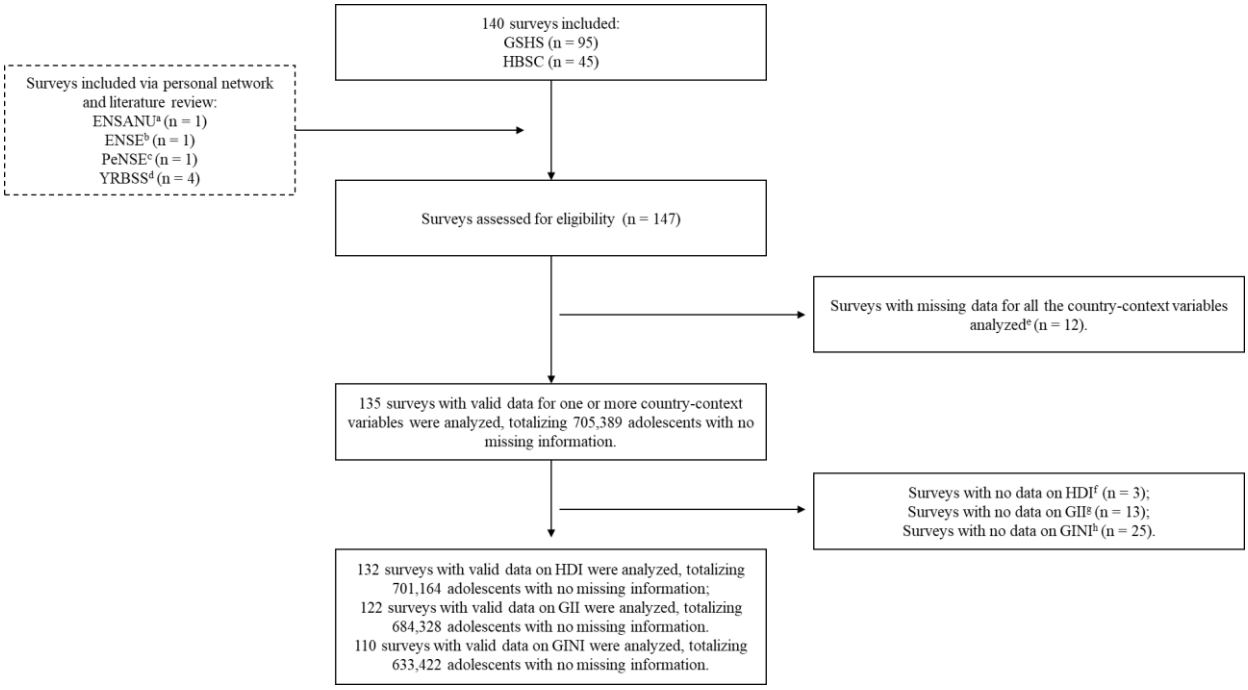

Fig 1 - Study flowchart. [a]Encuesta Nacional de Salud y Nutrición - Ecuador. [b]Encuesta Nacional de Salud Escolar - Colombia. [c]Pesquisa Nacional de Saúde do Escolar - Brazil. [d]Youth Risk Behavior Surveillance System.

Table S1A - Sample characteristics.

Country/territory	Survey	Survey year	Sample size	missing	Final sample	Girls (%)	≤14y (%)	Coverage	HDI	GII	GINI
East Asia & Pacific											
Brunei Darussalam	GSHS	2014	2599	49	2550	50.2	48.7		0.837	0.282	-
Cambodia	GSHS	2013	3806	44	3762	47.7	32.9		0.562	-	-
China	GSHS	2003	9015	224	8791	51.2	74.5	Beijing, Hangzhou, Wuhan, and Urumqi	0.615	0.263	0.525
Fiji	GSHS	2016	3705	216	3489	51.2	22.6		0.735	0.342	0.337
Indonesia	GSHS	2015	11142	263	10879	51.0	67.6		0.695	0.478	0.304
Kiribati	GSHS	2011	1582	27	1555	52.9	55.7		0.587		0.370
Lao PDR	GSHS	2015	3683	58	3625	46.8	16.0		0.599	0.488	0.374
Malaysia	GSHS	2012	25507	213	25294	49.9	41.7		0.780	0.275	0.426
Mongolia	GSHS	2013	5393	84	5309	51.8	49.2		0.726	0.336	0.329
Myanmar	GSHS	2016	2838	54	2784	53.5	67.4		0.572	0.126	0.344
Nauru	GSHS	2011	578	86	492	56.1	56.9		-	-	0.324
Palau	YRBS	2015	1093	26	1067	50.9	55.6		0.780	-	-
Philippines	GSHS	2015	8761	108	8653	50.6	49.8		0.698	0.430	0.446
Samoa	GSHS	2017	1955	158	1797	53.5	40.4		0.716	0.407	0.387
Solomon Islands	GSHS	2011	1421	125	1296	45.9	43.7		0.553	-	0.371
Thailand	GSHS	2015	2508	42	2466	54.5	51.1		0.781	0.416	0.360
Timor-Leste	GSHS	2015	3704	258	3446	49.3	24.4		0.614	0.404	0.287
Tonga	GSHS	2017	3333	65	3268	49.3	56.1		0.727	0.363	0.335
Tuvalu	GSHS	2013	943	66	877	51.9	59.1		0.628	-	0.391
Vanuatu	GSHS	2016	2159	67	2092	50.6	33.8		0.596	-	0.323
Vietnam	GSHS	2013	3331	23	3308	53.1	21.6		0.676	0.320	0.352
Europe & Central Asia											

Albania	HBSC	2018	1765	84	1681	55.3	53.8	0.806	0.164	0.301
Armenia	HBSC	2018	4717	430	4287	50.8	64.9	0.771	0.260	0.344
Austria	HBSC	2018	4129	178	3951	51.1	66.6	0.917	0.061	0.308
Azerbaijan	HBSC	2018	4586	48	4538	51.9	67.2	0.757	0.307	0.266
Belgium	HBSC	2018	9911	339	9572	50.6	67.2	0.933	0.053	0.272
Bulgaria	HBSC	2018	4548	112	4436	51.7	66.2	0.809	0.210	0.413
Croatia	HBSC	2018	5169	167	5002	48.8	57.4	0.856	0.125	0.297
Czech Republic	HBSC	2018	11564	30	11534	49.9	66.2	0.894	0.129	0.250
Denmark	HBSC	2018	3181	43	3138	51.7	71.2	0.942	0.022	0.282
Estonia	HBSC	2018	4725	74	4651	50.1	59.4	0.891	0.103	0.303
Finland	HBSC	2018	3146	27	3119	50.7	58.4	0.936	0.037	0.273
France	HBSC	2018	9170	227	8943	50.8	72.6	0.901	0.078	0.324
Georgia	HBSC	2018	4242	117	4125	50.5	68.2	0.804	0.298	0.364
Germany	HBSC	2018	4347	79	4268	53.0	63.8	0.945	0.083	0.318
Greece	HBSC	2018	3863	60	3803	50.5	57.4	0.886	0.127	0.329
Hungary	HBSC	2018	3789	111	3678	53.4	67.5	0.849	0.229	0.296
Iceland	HBSC	2018	6996	89	6907	50.0	65.4	0.959	0.053	0.261
Ireland	HBSC	2018	3833	122	3711	49.3	69.8	0.937	0.084	0.306
Italy	HBSC	2018	4144	57	4087	51.9	63.4	0.893	0.057	0.352
Kazakhstan	HBSC	2018	4868	184	4684	49.8	66.9	0.814	0.173	0.278
Latvia	HBSC	2018	4412	36	4376	50.4	67.8	0.866	0.155	0.351
Lithuania	HBSC	2018	3797	49	3748	49.8	60.9	0.880	0.128	0.357
Luxembourg	HBSC	2018	4070	351	3719	50.4	63.5	0.922	0.074	0.354
Moldova	HBSC	2018	4686	42	4644	49.8	64.8	0.768	0.241	0.257
Netherlands	HBSC	2018	4698	31	4667	48.7	64.8	0.936	0.027	0.281
North Macedonia	HBSC	2018	4658	76	4582	51.1	66.2	0.779	0.141	0.330
Norway	HBSC	2018	3127	87	3040	51.5	76.9	0.962	0.018	0.276
Poland	HBSC	2018	5224	38	5186	50.9	64.1	0.877	0.121	0.302
Portugal	HBSC	2018	6126	496	5630	52.4	73.6	0.860	0.074	0.335
Romania	HBSC	2018	4567	575	3992	50.4	66.4	0.827	0.282	0.358

Russian Federation	HBSC	2018	4281	55	4226	52.4	56.2		0.841	0.210	0.375
Serbia	HBSC	2018	3933	112	3821	50.7	53.0		0.808	0.132	0.350
Slovak Republic	HBSC	2018	4785	125	4660	48.7	73.1		0.859	0.194	0.250
Slovenia	HBSC	2018	5667	13	5654	48.6	64.9		0.917	0.074	0.246
Spain	HBSC	2018	4320	51	4269	51.5	62.6		0.901	0.062	0.347
Sweden	HBSC	2018	4185	236	3949	50.8	61.3		0.942	0.031	0.300
Switzerland	HBSC	2018	7510	96	7414	49.5	66.3		0.959	0.032	0.331
Turkey	HBSC	2018	5848	257	5591	51.1	67.7		0.839	0.286	0.419
Ukraine	HBSC	2018	6660	55	6605	48.6	67.3		0.783	0.249	0.261
United Kingdom	HBSC	2018	24369	1536	22833	50.2	64.3	England, Scotland, and Wales	0.929	0.112	0.337
Latin America & Caribbean											
Antigua and Barbuda	GSHS	2009	1186	70	1116	49.2	66.9		0.795	-	-
Argentina	GSHS	2018	56981	1984	54997	52.1	45.8		0.850	0.315	0.413
Bahamas, The	GSHS	2013	1357	49	1308	52.5	82.9		0.816	0.355	-
Barbados	GSHS	2011	1629	75	1554	51.2	58.5		0.784	0.316	-
Belize	GSHS	2011	2112	111	2001	51.9	63.5		0.709	0.453	-
Bolivia	GSHS	2018	7931	643	7288	49.2	30.2		0.714	0.419	0.426
Brazil	PeNSE	2015	16556	110	16446	49.1	46.0		0.753	0.437	0.519
Chile	GSHS	2013	2049	28	2021	50.4	40.0		0.836	0.300	0.458
Colombia	ENSE	2017	79640	3538	76102	53.5	40.8		0.761	0.427	0.497
Costa Rica	GSHS	2009	2679	38	2641	49.6	56.4		0.769	0.330	0.506
Dominica	GSHS	2009	1642	119	1523	49.2	57.3		0.713	-	-
Dominican Republic	GSHS	2016	1481	96	1385	50.6	25.4		0.755	0.457	-
Ecuador	ENSANUT	2018	13438	0	13438	48.3	63.2		0.762	0.375	0.454
El Salvador	GSHS	2013	1915	63	1852	48.2	58.3		0.667	0.398	0.434
Grenada	GSHS	2008	1542	97	1445	55.6	59.7		0.653	-	-
Guatemala	GSHS	2015	4374	244	4130	47.8	55.8		0.639	0.522	0.483
Guyana	GSHS	2010	2392	85	2307	51.3	55.6		0.656	0.496	-

Honduras	GSHS	2012	1779	75	1704	53.2	67.7		0.621	0.462	0.534
Jamaica	GSHS	2017	1667	71	1596	51.4	30.9		0.715	0.372	0.465
Panama	GSHS	2018	2948	109	2839	53.9	32.9		0.814	0.412	0.492
Paraguay	GSHS	2017	3149	165	2984	51.3	42.4		0.724	0.454	0.485
Peru	GSHS	2010	2882	42	2840	49.4	51.8		0.725	0.423	0.455
St. Kitts and Nevis	GSHS	2011	1740	50	1690	48.8	49.9		0.764	-	-
St. Lucia	GSHS	2018	1970	60	1910	52.9	53.8		-	0.394	0.512
St. Vincent and the Grenadines	GSHS	2018	1877	55	1822	51.3	30.3		-	0.411	-
Suriname	GSHS	2016	2126	48	2078	50.9	48.6		0.750	0.440	-
Trinidad and Tobago	GSHS	2017	2836	123	2713	52.5	54.9		0.817	0.348	-
Uruguay	GSHS	2012	3524	84	3440	54.2	52.8		0.798	0.329	0.399
Venezuela, RB	GSHS	2003	4415	139	4276	52.6	85.6	Barinas and Lara	0.693	0.530	0.369
Middle East & North Africa											
Algeria	GSHS	2011	4532	127	4405	52.0	57.6		0.721	0.516	-
Bahrain	GSHS	2016	7141	125	7016	49.1	54.5		0.809	0.236	-
Djibouti	GSHS	2007	1777	71	1706	40.1	29.0		0.488	-	0.451
Egypt, Arab Rep.	GSHS	2011	2568	123	2445	50.1	80.5		0.699	0.553	0.302
Iraq	GSHS	2012	2038	76	1962	42.8	51.1		0.660	0.569	0.295
Israel	HBSC	2018	7712	0	7712	49.6	65.7		0.919	0.089	-
Jordan	GSHS	2007	2197	48	2149	49.6	39.6		0.719	0.504	0.332
Kuwait	GSHS	2015	3637	372	3265	49.8	35.7		0.830	0.316	-
Lebanon	GSHS	2017	5708	341	5367	54.3	49.6		0.750	0.462	0.318
Libya	GSHS	2007	2242	114	2128	50.1	68.4		0.741	0.280	-
Malta	HBSC	2018	2576	114	2462	51.7	68.0		0.910	0.184	0.287
Morocco	GSHS	2016	6745	343	6402	46.2	43.4		0.661	0.440	-
Oman	GSHS	2015	3468	125	3343	50.3	29.1		0.823	0.341	-
Qatar	GSHS	2011	2021	192	1829	52.5	82.9		0.844	0.540	-
Syrian Arab Republic	GSHS	2010	3102	57	3045	48.7	75.7		0.660	0.509	0.375

Tunisia	GSHS	2008	2870	87	2783	49.8	70.0	0.711	0.299	0.358
United Arab Emirates	GSHS	2016	5849	168	5681	50.6	38.5	0.870	0.118	0.260
Yemen, Rep.	GSHS	2014	2655	190	2465	44.8	41.8	0.505	0.806	0.367
North America										
Canada	HBSC	2018	12950	511	12439	52.8	64.7	0.933	0.073	0.325
United States	HBSC	2010	6274	112	6162	48.2	68.5	0.911	0.248	0.400
South Asia										
Afghanistan	GSHS	2014	2579	151	2428	44.8	35.8	0.479	0.718	-
Bangladesh	GSHS	2014	2989	85	2904	34.5	65.6	0.583	0.568	0.321
Bhutan	GSHS	2016	7576	138	7438	52.0	28.9	0.638	0.486	0.374
India	GSHS	2007	8130	386	7744	41.6	65.6	0.553	0.603	0.354
Maldives	GSHS	2009	3227	242	2985	50.9	67.3	0.680	0.414	0.395
Nepal	GSHS	2015	6529	237	6292	50.9	55.9	0.579	0.495	0.328
Pakistan	GSHS	2009	5192	75	5117	38.6	61.7	0.502	0.591	-
Sri Lanka	GSHS	2016	3262	42	3220	51.2	47.4	0.767	0.376	0.393
Sub-Saharan Africa										
Benin	GSHS	2016	2536	37	2499	26.8	13.1	0.530	0.618	0.478
Botswana	GSHS	2005	2197	103	2094	51.7	32.3	0.604	0.513	0.647
Ghana	GSHS	2007	6236	287	5949	46.5	48.4	0.550	0.567	0.428
Kenya	GSHS	2003	3691	263	3428	51.3	58.2	0.495	0.655	0.465
Liberia	GSHS	2017	2744	428	2316	48.5	16.3	0.481	0.655	0.353
Mauritania	GSHS	2010	2063	112	1951	45.9	35.2	0.510	0.657	0.357
Mauritius	GSHS	2017	3012	66	2946	53.5	43.3	0.805	0.384	0.368
Mozambique	GSHS	2015	1918	124	1794	46.9	28.8	0.440	0.540	0.540
Namibia	GSHS	2013	4531	141	4390	53.2	24.9	0.611	0.484	0.591
Senegal	GSHS	2005	3154	95	3059	40.5	59.6	0.419	0.633	0.392
Seychelles	GSHS	2015	2540	101	2439	50.5	61.1	0.785	-	0.468
Sierra Leone	GSHS	2017	2798	117	2681	48.6	35.4	0.466	0.647	0.357
Sudan	GSHS	2012	2211	137	2074	46.9	39.3	0.493	0.598	0.342
Tanzania	GSHS	2014	3793	111	3682	51.0	61.0	0.549	0.570	0.378

Uganda	GSHS	2003	3215	229	2986	49.1	33.7		0.429	0.603	0.452
Zambia	GSHS	2004	2557	686	1871	46.8	45.7		0.459	0.623	0.543
Zimbabwe	GSHS	2003	5665	297	5368	50.3	39.9	Bulawayo, Harare, and Manicaland	0.439	0.629	0.432

Note: HDI, Human Development Index; GII, Gender Inequality Index.

Chart S1 - Procedure used to categorize physical activity in each survey included.

Survey (Country)	Physical activity assessment	Possible answers	No or low/some MVPA[g]	Physical activity guidelines
GSHS[a] (GSHS countries)	During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?	a) 0 days; b) 1 day; c) 2 days; d) 3 days; e) 4 days; f) 5 days; g) 6 days; h) 7 days.	0 days: no or low MVPA; ≥1 days: some MVPA.	≤6 days: no compliance with guidelines; 7 days: compliance with guidelines.
HBSC[b] (HBSC countries)	During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?	a) 0 days; b) 1 day; c) 2 days; d) 3 days; e) 4 days; f) 5 days; g) 6 days; h) 7 days.	0 days: no or low MVPA; ≥1 days: some MVPA.	≤6 days: no compliance with guidelines; 7 days: compliance with guidelines.
YRBSS[c] (YRBSS countries)	During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?	a) 0 days; b) 1 day; c) 2 days; d) 3 days; e) 4 days; f) 5 days; g) 6 days; h) 7 days.	0 days: no or low MVPA; ≥1 days: some MVPA.	≤6 days: no compliance with guidelines; 7 days: compliance with guidelines.
PeNSE[d] (Brazil)	During the past 7 days, on how many days were you physically active for a total of at least 60 minutes (1 hour) per day?	a) No days in the last 7 days; b) 1 day in the last 7 days; c) 2 days in the last 7 days; d) 3 days in the last 7 days; e) 4 days in the last 7 days; f) 5 days in the last 7 days; g) 5 days plus Saturday, in the last 7 days; h) 5 days plus Saturday and Sunday in the last 7 days.	0 days: no or low MVPA; ≥1 days: some MVPA.	≤6 days: no compliance with guidelines; 7 days: compliance with guidelines.
ENSE[e] (Colombia)	During the past 7 days, on how many days were you	a) 0 days; b) 1 day;	0 days: no or low MVPA; ≥1 days: some MVPA.	≤6 days: no compliance with guidelines; 7 days: compliance with guidelines.

	physically active for a total of at least 60 minutes per day?	c) 2 days; d) 3 days; e) 4 days; f) 5 days; g) 6 days; h) 7 days.		
ENSANUT[f] (Ecuador)	During the past 7 days, on how many days were you physically active for a total of at least 60 min per day? (exclude physical education classes at school).	Open question.	0 days: no or low MVPA; ≥1 days: some MVPA.	≤6 days: no compliance with guidelines; 7 days: compliance with guidelines.

Note: [a]Global School-based Student Health Survey. [b]Health Behaviour among School-aged Children. [c]Youth Risk Behavior Surveillance System. [d]*Pesquisa Nacional de Saúde do Escolar*. [e]*Encuesta Nacional de Salud Escolar*. [f] *Encuesta Nacional de Salud y Nutrición* – Ecuador. [g]moderate- to vigorous-intensity physical activity.

Table S2A - Prevalence of some MVPA and compliance with physical activity guidelines among adolescents by gender. The gap is the absolute difference between boys and girls, in percentage points.

Country/territory	Some MVPA (%)	Some MVPA among girls (%)	Some MVPA among boys (%)	Gap (p.p.)	Complience with PA guidelines (%)	Complience with PA guidelines among girls (%)	Complience with PA guidelines among boys (%)	Gap (p.p.)
East Asia & Pacific								
Brunei Darussalam	83.8 (82.2 - 85.2)	82.2 (79.9 - 84.2)	85.4 (83.2 -87.4)	3.2	12.4 (11.1 - 13.8)	5.4 (4.3 - 6.7)	19.4 (17.1 - 21.9)	14.0
Cambodia	61.5 (59.6 - 63.3)	58.7 (56.2 - 61.2)	64.1 (61.3 -66.8)	5.4	7.6 (6.6 - 8.6)	5.6 (4.4 - 6.9)	9.4 (8.0 - 11.0)	3.8
China								
	72.5 (71.4 - 73.6)	67.6 (65.9 - 69.1)	77.3 (75.8 - 78.7)	9.7	18.5 (17.5 - 19.5)	14.4 (13.2 - 15.8)	22.3 (20.8 - 23.9)	7.9
Fiji	74.0 (72.5 - 75.5)	72.8 (70.6 - 74.9)	75.3 (73.1 -77.4)	2.5	20.6 (19.3 - 22.1)	18.8 (17.0 - 20.7)	22.6 (20.6 - 24.7)	3.8
Indonesia	67.9 (67.0 - 68.9)	66.7 (65.3 - 68.0)	69.2 (67.8 -70.6)	2.5	12.2 (11.6 - 12.9)	11.6 (10.7 - 12.5)	12.9 (11.9 - 13.9)	1.3
Kiribati	72.0 (69.6 - 74.2)	66.6 (63.4 - 69.7)	78.0 (74.6 -81.0)	11.4	17.8 (15.9 - 19.8)	14.5 (12.3 - 17.0)	21.4 (18.4 - 24.7)	6.9
Lao PDR	77.0 (75.5 - 78.4)	69.4 (67.1 - 71.5)	83.7 (81.7 -85.5)	14.3	16.7 (15.4 - 18.2)	8.5 (7.2 - 9.9)	24.0 (21.8 - 26.4)	15.5
Malaysia	80.3 (79.7 - 80.9)	79.5 (78.6 - 80.3)	81.2 (80.4 -82.0)	1.7	14.2 (13.6 - 14.7)	8.5 (7.9 - 9.1)	19.8 (19.0 - 20.7)	11.3
Mongolia	86.2 (85.2 - 87.1)	84.7 (83.3 - 86.1)	87.7 (86.3 -88.9)	3.0	25.2 (24.0 - 26.4)	20.5 (19.0 - 22.0)	30.2 (28.4 - 32.1)	9.7
Myanmar	69.7 (67.8 - 71.4)	66.6 (64.1 - 69.0)	73.2 (70.5 -75.7)	6.6	10.8 (9.7 - 12.1)	8.6 (7.3 - 10.2)	13.4 (11.6 - 15.4)	4.8
Nauru	49.2 (44.5 - 53.9)	47.5 (41.6 - 53.5)	51.3 (43.8 -58.7)	3.8	11.3 (8.7 - 14.5)	8.6 (5.8 - 12.4)	14.7 (10.4 - 20.5)	6.1
Palau	76.9 (75.4 - 78.4)	76.4 (73.1 - 79.5)	77.5 (75.9 - 78.9)	1.1	26.3 (23.0 - 29.9)	29.7 (24.7 - 35.1)	22.9 (20.8 - 25.2)	-6.8
Philippines	55.9 (54.7 - 57.1)	57.3 (55.7 - 59.0)	54.4 (52.7 -56.2)	-2.9	7.4 (6.8 - 8.1)	7.0 (6.2 - 7.8)	7.9 (7.1 - 8.9)	0.9
Samoa	75.4 (73.1 - 77.6)	78.2 (75.5 - 80.6)	72.3 (68.2 -76.0)	-5.9	22.4 (20.4 - 24.6)	21.0 (18.6 - 23.5)	24.1 (20.7 - 27.9)	3.1
Solomon Islands	80.0 (77.3 - 82.4)	82.1 (78.3 - 85.4)	78.2 (74.3 -81.6)	-3.9	16.5 (14.3 - 18.9)	14.8 (12.0 - 18.2)	17.8 (14.7 - 21.4)	3.0
Thailand	75.6 (73.9 - 77.3)	74.5 (72.1 - 76.7)	77.0 (74.3 -79.4)	2.5	11.5 (10.3 - 12.9)	5.5 (4.4 - 6.8)	18.7 (16.5 - 21.2)	13.2
Timor-Leste	72.0 (70.4 - 73.5)	68.3 (66.0 - 70.5)	75.6 (73.3 -77.7)	7.3	9.8 (8.7 - 10.9)	5.4 (4.4 - 6.6)	14.0 (12.3 - 16.0)	8.6
Tonga	75.2 (73.7 - 76.7)	74.4 (72.2 - 76.4)	76.1 (73.8 -78.2)	1.7	17.9 (16.6 - 19.3)	17.3 (15.6 - 19.2)	18.5 (16.5 - 20.5)	1.2
Tuvalu	53.4 (50.1 - 56.7)	49.6 (45.0 - 54.2)	57.5 (52.7 -62.2)	7.9	11.6 (9.6 - 13.9)	10.0 (7.6 - 13.2)	13.3 (10.4 - 16.9)	3.3
Vanuatu	65.4 (63.1 - 67.5)	65.7 (62.7 - 68.5)	65.1 (61.7 -68.3)	-0.6	12.6 (11.1 - 14.3)	12.8 (10.8 - 15.2)	12.4 (10.3 - 14.9)	-0.4

Vietnam	72.2 (70.6 - 73.8)	66.8 (64.4 - 69.1)	78.4 (76.2 -80.5)	11.6	13.8 (12.6 - 15.1)	9.8 (8.3 - 11.4)	18.4 (16.5 - 20.6)	8.6
Europe & Central Asia								
Albania	95.9 (94.8 - 96.7)	96.0 (94.6 - 97.1)	95.7 (94.0 - 97.0)	-0.3	20.5 (18.6 - 22.5)	16.6 (14.3 - 19.1)	25.3 (22.3 - 28.5)	8.7
Armenia	96.7 (96.1 - 97.2)	96.8 (96.0 - 97.5)	96.5 (95.6 - 97.2)	-0.3	26.4 (25.1 - 27.7)	22.7 (20.9 - 24.5)	30.2 (28.3 - 32.2)	7.5
Austria	97.1 (96.5 - 97.5)	97.1 (96.2 - 97.7)	97.1 (96.2 - 97.7)	0.0	20.4 (19.2 - 21.7)	15.0 (13.5 - 16.6)	26.0 (24.1 - 28.0)	11.0
Azerbaijan	87.8 (86.9 - 88.8)	86.5 (85.1 - 87.9)	89.2 (87.9 - 90.5)	2.7	17.0 (16.0 - 18.2)	13.6 (12.3 - 15.0)	20.8 (19.1 - 22.5)	7.2
Belgium	95.2 (94.8 - 95.6)	94.5 (93.9 - 95.2)	95.9 (95.3 - 96.4)	1.4	17.5 (16.8 - 18.3)	13.9 (12.9 - 14.9)	21.3 (20.1 - 22.5)	7.4
Bulgaria	91.7 (90.9 - 92.5)	91.5 (90.3 - 92.6)	91.9 (90.7 - 93.0)	0.4	22.9 (21.7 - 24.2)	20.9 (19.3 - 22.6)	25.1 (23.3 - 27.0)	4.2
Croatia	97.1 (96.6 - 97.6)	96.9 (96.2 - 97.5)	97.3 (96.6 - 97.9)	0.4	22.7 (21.5 - 23.8)	19.1 (17.6 - 20.7)	26.1 (24.4 - 27.8)	7.0
Czech Republic	96.9 (96.6 - 97.2)	97.4 (96.9 - 97.8)	96.4 (95.9 - 96.9)	-1.0	18.1 (17.3 - 18.8)	14.4 (13.4 - 15.4)	21.7 (20.6 - 22.9)	7.3
Denmark	93.5 (92.5 - 94.3)	94.3 (93.0 - 95.3)	92.6 (91.2 - 93.8)	-1.7	10.6 (9.6 - 11.7)	8.5 (7.2 - 10.0)	12.8 (11.2 - 14.6)	4.3
Estonia	95.6 (95.0 - 96.2)	95.2 (94.3 - 96.0)	96.0 (95.1 - 96.7)	0.8	15.5 (14.4 - 16.5)	13.7 (12.4 - 15.2)	17.2 (15.7 - 18.8)	3.5
Finland	98.2 (97.6 - 98.6)	98.2 (97.4 - 98.8)	98.2 (97.4 - 98.7)	0.0	30.1 (28.4 - 31.8)	24.5 (22.3 - 26.8)	35.9 (33.4 - 38.5)	11.4
France	92.6 (92.0 - 93.3)	90.9 (89.9 - 91.8)	94.4 (93.6 - 95.2)	3.5	10.5 (9.8 - 11.2)	6.9 (6.1 - 7.8)	14.2 (13.0 - 15.4)	7.3
Georgia	90.5 (89.6 - 91.4)	89.2 (87.8 - 90.5)	91.9 (90.6 - 93.0)	2.7	21.2 (20.0 - 22.5)	17.5 (15.9 - 19.2)	25.0 (23.2 - 26.9)	7.5
Germany	96.3 (95.7 - 96.8)	95.8 (94.9 - 96.6)	96.8 (95.9 - 97.5)	1.0	12.9 (12.0 - 14.0)	9.7 (8.5 - 11.0)	16.6 (15.0 - 18.3)	6.9
Greece	95.0 (94.2 - 95.6)	94.8 (93.8 - 95.8)	95.1 (94.0 - 96.0)	0.3	16.4 (15.2 - 17.6)	12.6 (11.2 - 14.2)	20.1 (18.4 - 22.0)	7.5
Hungary	94.2 (93.4 - 94.9)	94.0 (92.8 - 95.0)	94.5 (93.3 - 95.5)	0.5	19.7 (18.5 - 21.1)	16.5 (14.9 - 18.2)	23.4 (21.5 - 25.5)	6.9
Iceland	94.8 (94.3 - 95.3)	95.2 (94.5 - 95.9)	94.4 (93.6 - 95.1)	-0.8	20.5 (19.6 - 21.5)	16.7 (15.5 - 18.0)	24.3 (22.9 - 25.8)	7.6
Ireland	96.8 (96.2 - 97.3)	96.1 (95.1 - 96.9)	97.5 (96.7 - 98.1)	1.4	26.5 (25.1 - 27.9)	21.0 (19.2 - 23.0)	31.8 (29.7 - 33.9)	10.8
Italy	91.4 (90.5 - 92.2)	89.8 (88.4 - 91.0)	93.2 (92.0 - 94.2)	3.4	8.7 (7.9 - 9.6)	5.3 (4.4 - 6.4)	12.4 (11.0 - 14.0)	7.1
Kazakhstan	97.8 (97.4 - 98.2)	97.5 (96.8 - 98.1)	98.2 (97.5 - 98.6)	0.7	34.4 (33.1 - 35.8)	32.4 (30.5 - 34.3)	36.4 (34.5 - 38.4)	4.0
Latvia	94.7 (94.0 - 95.3)	94.6 (93.6 - 95.5)	94.7 (93.7 - 95.6)	0.1	18.8 (17.7 - 20.0)	15.5 (14.0 - 17.1)	22.2 (20.5 - 24.0)	6.7
Lithuania	95.8 (95.1 - 96.4)	95.8 (94.8 - 96.6)	95.7 (94.7 - 96.6)	-0.1	18.3 (17.1 - 19.6)	16.1 (14.5 - 17.9)	20.5 (18.7 - 22.3)	4.4
Luxembourg	96.9 (96.3 - 97.4)	96.5 (95.5 - 97.2)	97.3 (96.4 - 97.9)	0.8	14.3 (13.2 - 15.5)	10.1 (8.8 - 11.5)	18.6 (16.9 - 20.4)	8.5
Moldova	92.1 (91.3 - 92.8)	91.0 (89.7 - 92.1)	93.2 (92.1 - 94.2)	2.2	14.8 (13.8 - 15.9)	12.7 (11.4 - 14.1)	16.9 (15.5 - 18.5)	4.2
Netherlands	96.8 (96.2 - 97.3)	97.0 (96.2 - 97.6)	96.6 (95.7 - 97.3)	-0.4	17.9 (16.8 - 19.0)	14.9 (13.5 - 16.4)	20.7 (19.0 - 22.5)	5.8
North Macedonia	95.7 (95.1 - 96.3)	94.0 (92.9 - 94.9)	97.5 (96.8 - 98.1)	3.5	31.3 (29.9 - 32.6)	25.9 (24.2 - 27.7)	36.8 (34.9 - 38.8)	10.9

Norway	97.3 (96.7 - 97.8)	98.0 (97.2 - 98.6)	96.5 (95.5 - 97.4)	-1.5	16.6 (15.3 - 17.9)	14.7 (13.0 - 16.5)	18.6 (16.7 - 20.7)	3.9
Poland	95.2 (94.6 - 95.7)	94.8 (93.9 - 95.6)	95.6 (94.7 - 96.3)	0.8	17.2 (16.2 - 18.2)	14.8 (13.5 - 16.2)	19.6 (18.1 - 21.2)	4.8
Portugal	96.8 (96.3 - 97.2)	96.7 (96.0 - 97.3)	96.9 (96.2 - 97.5)	0.2	10.3 (9.5 - 11.1)	7.0 (6.1 - 8.0)	13.9 (12.6 - 15.2)	6.9
Romania	100	100	100.0	0.0	14.0 (13.0 - 15.1)	10.4 (9.2 - 11.9)	17.7 (16.1 - 19.4)	7.3
Russian Federation	91.8 (91.0 - 92.6)	91.0 (89.7 - 92.1)	92.7 (91.5 - 93.8)	1.7	15.1 (14.1 - 16.3)	11.4 (10.1 - 12.8)	19.3 (17.6 - 21.1)	7.9
Serbia	95.3 (94.5 - 95.9)	93.8 (92.6 - 94.8)	96.8 (95.9 - 97.5)	3.0	33.6 (32.1 - 35.1)	25.5 (23.6 - 27.5)	41.9 (39.7 - 44.2)	16.4
Slovak Republic	95.8 (95.2 - 96.3)	95.6 (94.6 - 96.3)	96.0 (95.1 - 96.7)	0.4	23.0 (21.9 - 24.3)	18.6 (17.0 - 20.2)	27.3 (25.5 - 29.1)	8.7
Slovenia	96.8 (96.3 - 97.2)	96.0 (95.2 - 96.7)	97.5 (96.9 - 98.0)	1.5	22.6 (21.5 - 23.7)	17.2 (15.8 - 18.7)	27.6 (26.0 - 29.3)	10.4
Spain	96.5 (95.9 - 97.0)	95.1 (94.1 - 95.9)	98.0 (97.3 - 98.5)	2.9	21.4 (20.2 - 22.6)	14.5 (13.1 - 16.0)	28.7 (26.8 - 30.7)	14.2
Sweden	94.4 (93.6 - 95.1)	93.7 (92.5 - 94.7)	95.1 (94.1 - 96.0)	1.4	14.0 (13.0 - 15.1)	11.5 (10.2 - 13.0)	16.6 (15.0 - 18.3)	5.1
Switzerland	97.6 (97.2 - 97.9)	97.4 (96.8 - 97.9)	97.7 (97.2 - 98.1)	0.3	14.4 (13.6 - 15.2)	11.2 (10.2 - 12.3)	17.5 (16.3 - 18.8)	6.3
Turkey	88.3 (87.4 - 89.1)	85.9 (84.6 - 87.2)	90.7 (89.6 - 91.7)	4.8	14.3 (13.4 - 15.2)	10.3 (9.3 - 11.5)	18.4 (17.0 - 19.9)	8.1
Ukraine	94.6 (94.0 - 95.1)	93.8 (93.0 - 94.6)	95.3 (94.5 - 96.0)	1.5	26.0 (24.9 - 27.1)	21.3 (20.0 - 22.7)	30.4 (28.8 - 32.0)	9.1
United Kingdom	95.8 (95.5 - 96.1)	95.2 (94.7 - 95.6)	96.4 (96.0 - 96.7)	1.2	17.9 (17.4 - 18.4)	14.0 (13.4 - 14.7)	21.7 (21.0 - 22.5)	7.7
Latin America & Caribbean								
Antigua and Barbuda	69.4 (66.5 - 72.3)	67.2 (63.0 - 71.1)	71.6 (67.4 -75.6)	4.4	22.8 (20.3 - 25.5)	16.9 (14.1 - 20.2)	28.5 (24.5 - 32.8)	11.6
Argentina	82.1 (81.4 - 82.8)	78.6 (77.6 - 79.6)	85.9 (85.0 -86.8)	7.3	16.5 (15.9 - 17.1)	12.9 (12.2 - 13.7)	20.4 (19.4 - 21.4)	7.5
Bahamas, The	68.7 (66.1 - 71.3)	66.4 (62.6 - 69.9)	71.4 (67.5 -75.0)	5.0	15.3 (13.2 - 17.6)	11.7 (9.4 - 14.4)	19.3 (15.9 - 23.2)	7.6
Barbados	70.6 (68.1 - 73.0)	69.1 (65.7 - 72.4)	72.1 (68.5 -75.5)	3.0	18.5 (16.5 - 20.6)	13.0 (10.8 - 15.5)	24.2 (21.1 - 27.6)	11.2
Belize	68.0 (65.9 - 70.1)	65.6 (62.6 - 68.5)	70.6 (67.6 -73.5)	5.0	21.1 (19.4 - 23.0)	17.8 (15.5 - 20.3)	24.8 (22.0 - 27.7)	7.0
Bolivia	74.4 (73.4 - 75.5)	71.6 (70.0 - 73.1)	77.2 (75.8 -78.6)	5.6	11.4 (10.7 - 12.2)	8.6 (7.6 - 9.6)	14.2 (13.1 - 15.4)	5.6
Brazil	63.4 (62.4 - 64.5)	51.7 (50.2 -53.2)	74.7 (73.4 - 76.1)	23.0	7.8 (7.2 - 8.3)	4.0 (3.5 - 4.6)	11.4 (10.5 - 12.4)	7.4
Chile	82.4 (80.4 - 84.3)	78.2 (75.1 - 81.0)	86.7 (84.0 -89.0)	8.5	13.8 (12.2 - 15.7)	9.3 (7.3 - 11.7)	18.5 (16.0 - 21.3)	9.2
Colombia	82.8 (82.3 - 83.2)	80.4 (79.8 - 81.0)	85.5 (84.8 - 86.1)	5.1	15.2 (14.8 - 15.7)	11.5 (11.0 - 12.0)	19.5 (18.8 - 20.2)	8.0
Costa Rica	81.8 (80.2 - 83.2)	78.9 (76.6 - 81.1)	84.6 (82.4 -86.5)	5.7	18.4 (17.0 - 20.0)	12.1 (10.5 - 14.1)	24.6 (22.3 - 27.1)	12.5
Dominica	65.0 (62.5 - 67.4)	63.3 (59.9 - 66.5)	66.6 (62.9 -70.2)	3.3	16.1 (14.3 - 18.1)	15.4 (13.1 - 18.0)	16.8 (14.1 - 20.0)	1.4
Dominican Republic	67.0 (64.0 - 69.9)	62.1 (57.7 - 66.2)	72.1 (67.9 -76.0)	10.0	12.4 (10.5 - 14.6)	10.6 (8.3 - 13.4)	14.3 (11.4 - 17.9)	3.7
Ecuador	68.7 (67.3 - 70.1)	58.7 (56.6 - 60.8)	78.1 (76.3 - 79.7)	19.4	9.9 (9.1 - 10.9)	6.2 (5.3 - 7.4)	13.4 (12.0 - 14.9)	7.2

El Salvador	69.2 (66.9 - 71.4)	66.9 (63.4 - 70.1)	71.3 (68.1 -74.3)	4.4	12.9 (11.4 - 14.5)	9.6 (7.7 - 11.9)	15.9 (13.7 - 18.4)	6.3
Grenada	61.3 (58.5 - 63.9)	60.2 (56.5 - 63.7)	62.6 (58.5 -66.6)	2.4	15.1 (13.2 - 17.2)	13.3 (11.0 - 16.1)	17.3 (14.4 - 20.7)	4.0
Guatemala	69.7 (66.8 - 72.4)	67.8 (63.7 - 71.7)	71.4 (67.4 -75.1)	3.6	10.7 (9.1 - 12.5)	8.8 (6.8 - 11.4)	12.4 (10.1 - 15.2)	3.6
Guyana	59.5 (57.3 - 61.6)	56.2 (53.3 - 59.0)	62.9 (59.8 -66.0)	6.7	15.5 (14.0 - 17.1)	13.3 (11.5 - 15.3)	17.9 (15.6 - 20.4)	4.6
Honduras	70.4 (68.1 - 72.6)	64.4 (61.1 - 67.6)	77.2 (74.1 -80.0)	12.8	15.8 (14.0 - 17.7)	12.6 (10.5 - 15.1)	19.4 (16.7 - 22.4)	6.8
Jamaica	70.8 (68.4 - 73.2)	71.1 (67.8 - 74.1)	70.6 (66.8 -74.1)	-0.5	23.7 (21.4 - 26.1)	22.7 (19.8 - 25.9)	24.7 (21.4 - 28.5)	2.0
Panama	76.4 (74.7 - 77.9)	70.7 (68.4 - 73.0)	82.7 (80.5 -84.7)	12.0	14.7 (13.4 - 16.1)	9.4 (8.0 - 11.0)	20.7 (18.5 - 23.1)	11.3
Paraguay	77.8 (76.2 - 79.3)	72.1 (69.7 - 74.3)	83.9 (81.8 -85.7)	11.8	16.6 (15.3 - 18.0)	11.7 (10.2 - 13.4)	21.8 (19.7 - 24.1)	10.1
Peru	81.7 (80.2 - 83.1)	81.8 (79.7 - 83.8)	81.6 (79.4 -83.6)	-0.2	15.3 (14.0 - 16.7)	14.1 (12.4 - 16.1)	16.4 (14.5 - 18.5)	2.3
St. Kitts and Nevis	67.5 (65.1 - 69.9)	64.3 (61.1 - 67.5)	70.6 (67.0 -73.9)	6.3	18.5 (16.6 - 20.6)	14.7 (12.5 - 17.2)	22.1 (19.2 - 25.4)	7.4
St. Lucia	70.2 (68.0 - 72.4)	68.5 (65.4 - 71.5)	72.2 (69.0 -75.1)	3.7	21.3 (19.4 - 23.3)	17.4 (15.0 - 20.0)	25.7 (22.8 - 28.8)	8.3
St. Vincent and the Grenadines	68.4 (66.2 - 70.5)	62.4 (59.2 - 65.5)	74.7 (71.6 -77.6)	12.3	18.4 (16.7 - 20.3)	16.7 (14.5 - 19.3)	20.2 (17.6 - 23.1)	3.5
Suriname	65.7 (63.5 - 67.8)	65.5 (62.5 - 68.4)	65.9 (62.7 -68.9)	0.4	18.9 (17.2 - 20.7)	16.5 (14.4 - 19.0)	21.3 (18.8 - 24.0)	4.8
Trinidad and Tobago	73.1 (71.4 - 74.8)	72.8 (70.4 - 75.0)	73.6 (70.9 -76.1)	0.8	20.3 (18.8 - 21.9)	15.9 (14.1 - 17.9)	25.1 (22.7 - 27.7)	9.2
Uruguay	79.2 (77.7 - 80.5)	72.6 (70.5 - 74.7)	86.9 (85.1 - 88.6)	14.3	15.7 (14.5 - 17.1)	9.3 (8.0 - 10.8)	23.3 (21.2 - 25.6)	14.0
Venezuela, RB	61.3 (59.7 - 63.0)	56.4 (54.1 - 58.6)	66.9 (64.4 - 69.3)	10.5	8.5 (7.6 - 9.5)	4.6 (3.8 - 5.6)	12.7 (11.1 - 14.6)	8.1
Middle East & North Africa								
Algeria	87.5 (86.2 - 88.6)	85.5 (83.7 - 87.2)	89.6 (87.9 -91.1)	4.1	15.5 (14.3 - 16.8)	7.7 (6.5 - 9.2)	23.9 (21.8 - 26.0)	16.2
Bahrain	77.5 (76.4 - 78.7)	75.5 (73.8 - 77.1)	79.5 (77.9 -81.0)	4.0	19.8 (18.8 - 20.9)	13.3 (12.1 - 14.6)	26.1 (24.5 - 27.8)	12.8
Djibouti	71.7 (69.5 - 73.8)	66.2 (62.7 - 69.6)	75.4 (72.6 -78.1)	9.2	15.7 (14.0 - 17.6)	11.0 (8.9 - 13.5)	18.9 (16.5 - 21.6)	7.9
Egypt, Arab Rep.	71.1 (69.2 - 72.8)	57.4 (54.6 - 60.2)	84.7 (82.6 -86.7)	27.3	14.1 (12.8 - 15.5)	8.5 (7.1 - 10.1)	19.7 (17.5 - 22.1)	11.2
Iraq	62.9 (60.7 - 65.1)	55.3 (51.9 - 58.6)	68.6 (65.8 -71.4)	13.3	14.8 (13.3 - 16.5)	8.7 (7.0 - 10.8)	19.4 (17.1 - 21.9)	10.7
Israel	85.5 (84.6 - 86.3)	83.0 (81.8 - 84.1)	87.9 (86.7 - 89.0)	4.9	12.0 (11.2 - 12.8)	8.2 (7.3 - 9.1)	15.7 (14.5 - 17.0)	7.5
Jordan	68.3 (66.3 - 70.3)	64.8 (61.7 - 67.9)	71.8 (69.2 -74.3)	7.0	14.4 (13.0 - 16.0)	11.3 (9.4 - 13.6)	17.5 (15.4 - 19.8)	6.2
Kuwait	76.9 (75.3 - 78.3)	74.8 (72.7 - 76.9)	78.9 (76.7 -80.9)	4.1	15.5 (14.2 - 16.8)	12.5 (11.0 - 14.2)	18.3 (16.4 - 20.4)	5.8
Lebanon	73.4 (72.1 - 74.8)	68.0 (66.0 - 69.9)	79.9 (78.0 -81.8)	11.9	14.3 (13.2 - 15.5)	9.5 (8.3 - 10.8)	20.0 (18.2 - 22.0)	10.5
Libya	64.8 (62.7 - 66.8)	56.5 (53.7 - 59.3)	73.1 (70.1 -75.9)	16.6	16.6 (15.0 - 18.3)	11.7 (10.0 - 13.6)	21.5 (18.9 - 24.4)	9.8
Malta	93.4 (92.3 - 94.3)	92.5 (90.9 - 93.8)	94.4 (92.9 - 95.5)	1.9	18.1 (16.6 - 19.7)	13.7 (11.9 - 15.7)	22.9 (20.6 - 25.4)	9.2

Morocco	77.6 (76.4 - 78.7)	75.7 (73.9 - 77.4)	79.3 (77.7 -80.8)	3.6	10.8 (10.0 - 11.8)	7.9 (6.9 - 9.1)	13.3 (12.1 - 14.8)	5.4
Oman	72.0 (70.4 - 73.5)	69.4 (67.2 - 71.5)	74.7 (72.4 -76.8)	5.3	11.5 (10.5 - 12.7)	8.2 (7.0 - 9.6)	14.9 (13.3 - 16.8)	6.7
Qatar	68.6 (66.5 - 70.7)	65.3 (62.3 - 68.2)	72.3 (69.1 -75.2)	7.0	9.8 (8.5 - 11.3)	8.3 (6.8 - 10.2)	11.4 (9.4 - 13.8)	3.1
Syrian Arab Republic	65.0 (63.1 - 66.7)	59.7 (57.4 - 62.1)	69.9 (67.2 -72.5)	10.2	11.1 (10.0 - 12.4)	7.8 (6.7 - 9.2)	14.3 (12.4 - 16.5)	6.5
Tunisia	75.5 (73.9 - 77.1)	67.5 (65.0 - 69.9)	83.5 (81.4 -85.4)	16.0	18.9 (17.5 - 20.4)	11.9 (10.3 - 13.7)	25.8 (23.5 - 28.3)	13.9
United Arab Emirates	78.9 (77.8 - 80.1)	77.7 (76.0 - 79.2)	80.3 (78.6 -81.8)	2.6	15.8 (14.8 - 16.9)	11.4 (10.2 - 12.7)	20.3 (18.6 - 22.0)	8.9
Yemen, Rep.	61.9 (59.8 - 63.9)	53.5 (50.6 - 56.3)	68.7 (65.7 -71.5)	15.2	12.7 (11.4 - 14.3)	8.8 (7.3 - 10.5)	16.0 (13.8 - 18.4)	7.2
North America								
Canada	96.9 (96.4 - 97.3)	96.6 (95.9 - 97.2)	97.1 (96.4 - 97.7)	0.5	26.1 (25.0 - 27.3)	20.8 (19.3 - 22.3)	32.2 (30.4 - 34.0)	11.4
United States	93.6 (93.0 - 94.2)	92.2 (91.1 - 93.1)	94.9 (94.1 - 95.6)	2.7	26.6 (25.5 - 27.7)	20.1 (18.7 - 21.6)	32.6 (31.0 - 34.2)	12.5
South Asia								
Afghanistan	71.9 (69.9 - 73.8)	65.8 (63.1 - 68.4)	76.8 (73.9 -79.4)	11.0	9.9 (8.3 - 11.7)	9.9 (8.3 - 11.7)	10.1 (8.3 - 12.2)	0.2
Bangladesh	75.3 (73.1 - 77.4)	69.0 (66.3 - 71.7)	78.7 (75.5 -81.5)	9.7	40.6 (37.9 - 43.4)	40.6 (37.9 - 43.4)	41.8 (38.3 - 45.3)	1.2
Bhutan	74.0 (73.0 - 75.0)	70.4 (69.0 - 71.8)	77.9 (76.4 -79.3)	7.5	13.5 (12.5 - 14.7)	13.5 (12.5 - 14.7)	15.8 (14.5 - 17.1)	2.3
India	75.5 (74.4 - 76.6)	74.1 (72.4 - 75.7)	76.5 (75.0 -77.9)	2.4	28.5 (26.7 - 30.3)	28.5 (26.7 - 30.3)	30.4 (28.8 - 32.0)	1.9
Maldives	57.5 (55.5 - 59.4)	50.8 (48.2 - 53.5)	64.4 (61.5 - 67.2)	13.6	20.3 (18.8 - 22.0)	17.3 (15.3 - 19.4)	23.5 (21.0 - 26.1)	3.2
Nepal	50.3 (48.8 - 51.8)	45.7 (43.6 - 47.8)	55.1 (52.9 -57.2)	9.4	13.1 (11.8 - 14.4)	13.1 (11.8 - 14.4)	17.4 (15.9 - 19.1)	4.3
Pakistan	52.3 (50.8 - 53.8)	44.6 (41.8 - 47.5)	57.1 (55.5 -58.8)	12.5	9.5 (7.9 - 11.3)	9.5 (7.9 - 11.3)	12.7 (11.7 - 13.9)	3.2
Sri Lanka	81.6 (80.2 - 83.0)	81.5 (79.6 - 83.3)	81.8 (79.7 -83.7)	0.3	11.7 (10.3 - 13.3)	11.7 (10.3 - 13.3)	19.3 (17.3 - 21.5)	7.6
Sub-Saharan Africa								
Benin	91.0 (89.8 - 92.1)	86.7 (84.6 - 88.5)	92.6 (91.1 -93.9)	5.9	22.5 (20.1 - 25.1)	22.5 (20.1 - 25.1)	32.2 (29.6 - 34.9)	9.7
Botswana	59.5 (57.4 - 61.6)	58.1 (55.2 - 60.9)	61.0 (57.8 -64.1)	2.9	11.5 (9.7 - 13.5)	11.5 (9.7 - 13.5)	12.7 (10.7 - 15.0)	1.2
Ghana	71.8 (70.5 - 73.1)	70.8 (68.9 - 72.6)	72.7 (70.9 -74.5)	1.9	12.4 (11.1 - 13.8)	12.4 (11.1 - 13.8)	13.5 (12.2 - 15.0)	1.1
Kenya	73.0 (71.3 - 74.5)	69.8 (67.4 - 72.1)	76.3 (74.1 -78.5)	6.5	11.2 (9.6 - 12.9)	11.2 (9.6 - 12.9)	14.2 (12.5 - 16.1)	3.0
Liberia	63.9 (61.7 - 66.0)	58.3 (55.2 - 61.4)	69.1 (66.1 -71.9)	10.8	8.8 (7.1 - 10.9)	8.8 (7.1 - 10.9)	15.7 (13.6 - 18.1)	6.9
Mauritania	59.6 (57.3 - 61.8)	51.2 (48.1 - 54.3)	66.7 (63.4 -69.7)	15.5	7.7 (6.2 - 9.5)	7.7 (6.2 - 9.5)	16.6 (14.3 - 19.1)	8.9
Mauritius	77.0 (75.3 - 78.6)	72.5 (69.9 - 74.9)	82.2 (80.0 -84.3)	9.7	12.7 (11.0 - 14.5)	12.7 (11.0 - 14.5)	26.2 (23.9 - 28.7)	13.5
Mozambique	79.2 (76.8 - 81.4)	73.3 (69.4 - 76.9)	84.4 (81.6 -86.9)	11.1	8.8 (6.6 - 11.7)	8.8 (6.6 - 11.7)	19.3 (16.5 - 22.4)	10.5

Namibia	62.8 (61.3 - 64.3)	61.1 (59.0 - 63.2)	64.7 (62.6 -66.8)	3.6	13.3 (11.9 - 14.8)	13.3 (11.9 - 14.8)	15.2 (13.6 - 16.8)	1.9
Senegal	69.6 (67.8 - 71.4)	60.4 (57.5 - 63.3)	75.9 (73.6 -78.0)	15.5	6.3 (5.1 - 7.9)	6.3 (5.1 - 7.9)	14.3 (12.6 - 16.2)	8.0
Seychelles	68.8 (66.9 - 70.6)	67.4 (64.8 - 70.0)	70.1 (67.3 -72.8)	2.7	14.5 (12.7 - 16.6)	14.5 (12.7 - 16.6)	20.1 (17.8 - 22.6)	5.6
Sierra Leone	74.3 (72.4 - 76.1)	72.8 (70.1 - 75.3)	75.7 (72.9 -78.3)	2.9	15.8 (13.8 - 18.1)	15.8 (13.8 - 18.1)	20.1 (17.5 - 22.9)	4.3
Sudan	69.3 (67.0 - 71.6)	64.0 (61.1 - 66.7)	74.1 (70.3 -77.5)	10.1	7.9 (6.4 - 9.6)	7.9 (6.4 - 9.6)	8.5 (6.6 - 10.9)	0.6
Tanzania	72.4 (70.8 - 73.9)	69.3 (67.0 - 71.4)	75.7 (73.5 -77.8)	6.4	17.2 (15.5 - 19.1)	17.2 (15.5 - 19.1)	23.1 (21.1 - 25.2)	5.9
Uganda	72.9 (71.2 - 74.5)	69.4 (66.8 - 71.9)	76.2 (73.9 -78.4)	6.8	13.4 (11.7 - 15.4)	13.4 (11.7 - 15.4)	15.3 (13.5 - 17.2)	1.9
Zambia	63.9 (61.5 - 66.3)	64.4 (61.1 - 67.5)	63.6 (60.0 -67.0)	-0.8	10.9 (8.9 - 13.3)	10.9 (8.9 - 13.3)	8.9 (6.9 - 11.3)	-2.0
Zimbabwe	60.8 (59.4 - 62.2)	59.8 (57.9 - 61.7)	61.9 (59.7 - 64.0)	2.1	12.9 (12.0 - 13.9)	11.3 (10.2 - 12.6)	14.5 (13.0 - 16.1)	1.6

Note: MVPA, moderate to vigorous physical activity. PA, physical activity. Some MVPA, at least 60 min/day of MVPA ≥1 day per week.

5. Considerações finais

Síntese dos principais achados

Ao longo da presente tese, buscou-se sintetizar o uso de um critério para a vigilância em atividade física que tivesse como foco indivíduos com pouca ou nenhuma AFMV, bem como foram exploradas prevalências, desigualdades e correlatos, considerando tanto o critério de pouca ou nenhuma AFMV quanto o critério baseado nas recomendações da OMS (2010). Dessa forma, os produtos da tese foram apresentados por meio de três artigos, sendo um comentário e dois artigos originais. Apesar da extensão dos resultados encontrados, os quais envolveram 146 países, alguns destaques podem ser feitos.

O uso do critério de pouca ou nenhuma AFMV revelou que enquanto países do Norte Global apresentaram um pequeno percentual de adolescentes reportando nenhum dia de AFMV por semana (~5%), somada a baixas desigualdades de gênero, países do Sul Global demonstraram um maior percentual de adolescentes reportando nenhum dia por semana de AFMV (>23%), somada a uma maior desigualdade de gênero, a qual foi liderada especialmente por países do Oriente Médio e Norte da África, Sul da Ásia e América Latina e Caribe. Além disso, as desigualdades de gênero foram maiores entre adolescentes com idade acima de 14 anos. As professoras Barbara Ainsworth e Haili Tian escreveram um comentário a respeito desses achados, o qual pode ser encontrado sob o doi de número 10.1016/j.jshs.2024.100983.

No terceiro artigo, ambos os critérios de atividade física foram utilizados com o intuito de explorar correlatos macroeconômicos e sociais. Desse modo, observou-se que as prevalências de atividade física foram maiores quando os países apresentavam melhores indicadores. No entanto, as associações dos indicadores macroeconômicos e sociais com as desigualdades de gênero foram inconsistentes, com países com melhores indicadores mostrando menores desigualdades de gênero em atividade física com o critério de pouca ou nenhuma atividade física e maiores desigualdades quando o critério foi baseado nas recomendações da OMS. Após estratificação por classificação de renda dos países, observou-se que as associações foram consistentes quando o critério de pouca ou nenhuma atividade física foi utilizado; no entanto, quando o cumprimento com as recomendações foi o desfecho, a consistência das associações foi observada apenas no Sul Global, indicando um possível efeito teto.

Implicações

A presente tese desemboca em diferentes implicações, as quais, embora aqui apresentadas como implicações acadêmicas, implicações para vigilância e políticas, possibilidades de sobreposição não são excluídas.

As implicações acadêmicas abrangem pontos que autor considera importantes para estudos futuros, tanto no que diz respeito ao que pode ser realizado com dados atualmente disponíveis (por exemplo, GSHS ou HSBS), quanto ao que demandaria esforços adicionais para o levantamento de informações.

- Apesar do uso do critério de pouca ou nenhuma atividade física como um *proxy* do acesso/oportunidades para a prática de atividade física, esforços para a elaboração e desenvolvimento de instrumentos para avaliar especificamente este construto são bem-vindos.
- Apesar importância das análises de desigualdades de gênero conduzidas por meio da presente tese, sabe-se que desigualdades sociais em atividade física também se apresentam de forma interseccional, ou seja, há uma complexa sobreposição de características (p.ex: gênero, raça/cor, idade, escolaridade) que precisam ser exploradas de maneira conjunta. Assim, estratégias futuras poderiam se beneficiar tanto da harmonização e análise de dados globais, quanto da condução de revisões sistemáticas com o intuito de identificar distribuição da atividade física em diferentes grupos populacionais;
- Embora estudos prévios tenham usado microdados existentes com o intuito de explorar prevalências, desigualdades e tendências em relação ao cumprimento com recomendações de atividade física entre adolescentes, análises de tendências considerando o critério de pouca ou nenhuma AFMV envolvendo múltiplos países ainda não foram realizadas. Ademais, mesmo considerando o número de países com inquéritos conduzidos em mais de um ano seja menor do o número de países com inquéritos dois ou mais anos, compreender essa dinâmica pode fornecer informações importantes sobre da cobertura de atividade física.

Implicações para vigilância e políticas

Uma das metas da OMS é a redução da inatividade física em 15% até 2030. Embora evidências entre adolescentes ainda não estejam disponíveis, não há indicativos que esse número será alcançado. Apesar do reconhecimento da importância dessa meta para pautar a necessidade de agendas de promoção de atividade física, um ponto que identificamos nesta tese foi que um número considerável de adolescentes

sequer alcança um dia de atividade física, especialmente aqueles vivendo no Sul Global. Assim:

- Os achados da presente tese levantam questionamentos sobre como as metas de redução da inatividade física em 15% até 2030 poderia ter diferentes prioridades entre os países. Por exemplo, entre países do Sul Global, uma meta importante poderia estar atrelada a redução da prevalência de “pouca ou nenhuma AFMV”. Aqui, é válido ressaltar que países da América do Norte e Europa & Ásia Central apresentam prevalências de pouca ou nenhuma atividade física em torno de 5%, sendo essas prevalências acima de 23% nas outras regiões. Assim, esforços como a garantia de aulas de Educação Física escolar (atrelada a políticas de permanência escolar e distribuição de renda para aqueles menos favorecidos), formação e contratação de recursos humanos, e construção/revitalização de espaços de lazer em áreas mais necessitadas poderiam figurar dentre as prioridades para mudanças nos cenários;
- Apesar da sugestão anterior sobre o uso de um ponto de corte que consiga capturar aqueles com pouca ou nenhuma atividade física em estudos posteriores, é essencial que sistemas de vigilância também façam a adoção de um critério que consiga monitorar o percentual da população menos assistida em relação à prática de atividade física – sendo válido ressaltar que pequenas variações neste comportamento poderiam não ser notadas facilmente com uso de pontos de corte mais restritos (como as recomendações). Além disso, sistemas de vigilância dos países também poderiam apresentar análises mais profundas e contextualizadas sobre desigualdades sociais em atividade física, o que poderia ser inviável em estudos com foco em múltiplos países.
- Com a confecção de questões para investigar o acesso/oportunidades para a prática de atividade física, seções sobre este comportamento poderiam ser incluí-las em questionários utilizados em inquéritos nacionais*;*
- Atualmente, iniciativas globais como o GoPA e a Global Matrix têm apresentado indicadores de prevalências e desigualdades socais em atividade física. No entanto, a presença de um critério mais sensível como discutido na presente tese parece ainda não ter sido contemplada. Assim, os achados apresentados por meio deste documento podem trazer *insights* para a inclusão de uma perspectiva de pouca ou nenhuma AFMV por parte de iniciativas globais. Também é válido ressaltar que essa abordagem tem sido empregada em estudos regionais, incluindo países da América do Sul e África, apontando assim uma capilarização das ideias levantadas.

Nota final

O processo de escrita da presente tese teve um papel ímpar na formação do autor, permitindo-o experienciar desde assuntos mais disseminados na Epidemiologia da Atividade Física, como harmonização de bancos de dados, análises descritivas e de associação, até debates que, embora mais frequentes em outros áreas, ainda são pouco abordados em Epidemiologia da Atividade Física.

A colaboração internacional também foi elemento amadurecido ao longo do processo de doutoramento. Tendo em vista a perspectiva de utilizar informações de diferentes regiões do mundo, o autor buscou contactar colegas de diferentes partes do globo para contribuir no processo de confecção dos manuscritos. Considerando os dois artigos já publicados, foram envolvidas 17 pessoas (sem contar o autor), representando 10 países, estendendo aqui também as contribuições das bancas de qualificação e defesa, bem como os comentários oriundos dos processos de revisão por pares.

Assim, por meio da sistematização de uma abordagem complementar para a vigilância em atividade física, bem como com um estudo sobre prevalências e desigualdades relacionadas aos grupos menos favorecidos, o autor espera que os achados da presente tese possam contribuir para confecção de documentos de vigilância, inquéritos populacionais e formulação de políticas públicas com o intuito de promover a prática de atividade física e reduzir as desigualdades sociais intra e entre países. Além disso, o autor também espera que os frutos da presente tese possam somar forças para inspirar pesquisas que não se limitem a convenção da área, mas que suas investigações possam buscar um diálogo mais profundo com suas próprias questões.