WHO GUIDELINES ON PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOUR

WEB ANNEX Evidence Profiles*



* The main guidelines document is available at:

https://apps.who.int/iris/bitstream/ handle/10665/336656/978924 0015128-eng.pdf



WHO guidelines on physical activity and sedentary behaviour: Web Annex. Evidence profiles ISBN 978-92-4-001511-1

© World Health Organization 2020

Some rights reserved. This work is available under the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 IGO licence (CC BY-NC-SA 3.0 IGO; https://creativecommons.org/licenses/by-nc-sa/3.0/igo).

Under the terms of this licence, you may copy, redistribute and adapt the work for non-commercial purposes, provided the work is appropriately cited, as indicated below. In any use of this work, there should be no suggestion that WHO endorses any specific organization, products or services. The use of the WHO logo is not permitted. If you adapt the work, then you must license your work under the same or equivalent Creative Commons licence. If you create a translation of this work, you should add the following disclaimer along with the suggested citation: "This translation was not created by the World Health Organization (WHO). WHO is not responsible for the content or accuracy of this translation. The original English edition shall be the binding and authentic edition".

Any mediation relating to disputes arising under the licence shall be conducted in accordance with the mediation rules of the World Intellectual Property Organization.

Suggested citation. WHO guidelines on physical activity and sedentary behaviour: Web Annex. Evidence profiles. Geneva: World Health Organization; 2020. Licence: CC BY-NC-SA 3.0 IGO.

Cataloguing-in-Publication (CIP) data. CIP data are available at http://apps.who.int/iris.

Sales, rights and licensing. To purchase WHO publications, see http://apps.who.int/bookorders. To submit requests for commercial use and queries on rights and licensing, see http://www.who.int/about/licensing.

Third-party materials. If you wish to reuse material from this work that is attributed to a third party, such as tables, figures or images, it is your responsibility to determine whether permission is needed for that reuse and to obtain permission from the copyright holder. The risk of claims resulting from infringement of any third-party-owned component in the work rests solely with the user.

General disclaimers. The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of WHO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by WHO in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by WHO to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall WHO be liable for damages arising from its use.

Design: Eddy Hill Design



CONTENTS

Method	5	1
A1 & A2:	Evidence on physical activity and sedentary behaviour for children and adolescents (5 to under 18 years of age)	8
B1:	Evidence on physical activity for adults (18 to under 65 years of age)	99
B2:	Evidence on sedentary behaviour for adults (18 years of age and older)	239
C1:	Evidence on physical activity for older adults (over 64 years of age)	272
D1:	Evidence on physical activity for pregnant and postpartum women	312
E1:	Evidence on physical activity for adults living with chronic conditions	348
F1:	Evidence on physical activity for children, adolescents and adults living with disability	464



METHODS

Scope of guideline and questions of interest

The Guideline Development Group (GDG) reviewed the scope of the guideline and agreed on the most relevant PI/ECO (<u>P</u>opulation, <u>I</u>ntervention/Exposure, <u>C</u>omparison, <u>O</u>utcome) questions at their first meeting. The key questions which were addressed for each sub population are summarised below:

What is the association between **physical activity** and health-related outcomes?

- a. Is there a dose-response association (volume, duration, frequency, intensity)?
- b. Does the association vary by type or domain of physical activity?

What is the association between **sedentary behaviour** and health-related outcomes?

- a. Is there a dose-response association (total volume and the frequency, duration and intensity of interruption)?
- b. Does the association vary by type and domain of sedentary behaviour?

For each **Population (P)**, the **Exposure (E)** was greater volume, duration, frequency or intensity of physical activity; with as **Comparison(C)** no physical activity or lesser volume, duration, frequency, or intensity of physical activity. The critical and important outcomes for each population

are summarised in Table 1 in Annex 1 and the details of each PI/ECO question in the relevant section of Annex 1.

The GDG recommended use of the most recently published relevant systematic reviews to address the PI/ECO questions and requested that the available systematic reviews be updated to reflect the most recent data.

The evidence

The update of the WHO recommendations on physical activity has been conducted by identifying and updating the most recent, relevant umbrella reviews related to the scope of these guidelines. This approach was adopted due to an extensive body of systematic reviews conducted in recent years undertaken to inform the development of a number of national physical activity guidelines. The additional updating of the identified reviews was undertaken to ensure the new WHO guidelines reflect the most recent available data in a rapidly developing field of public health.

Umbrella reviews were selected if they met the following three criteria: (1) the evidence reviews had been conducted according to standard systematic processes that were well documented; (2) the assessment of the certainty of the evidence used the Grading of Recommendations Assessment, Development and Evaluation (GRADE) method or an equivalent methodology that was clearly described and documented; and (3) the evidence reviews addressed the populations of interest with no restrictions to country or country income level.

The PI/ECO questions and the critical and important health outcomes were mapped against existing evidence reviews and where needed additional

new reviews were commissioned to address gaps. The GDG requested that the evidence reviews be updated, using the same search terms, search languages and databases as the original reviews.

The following evidence reviews were identified as meeting the above three criteria and were chosen for recency and comprehensiveness:

• A systematic review of the literature conducted by Poitras et al., (2016) on the association between physical activity and health indicators in school aged children and youth (1) as part of the process for developing the *Canadian 24-Hour Movement Guidelines for Children and Youth (2)*. This review focused only on studies that used objective measurements of physical activity.

A total of 162 studies were included (204,171 participants from 31 countries) in the review.

• A systematic review of the literature of the association between sedentary behaviour and health indicators in school-aged children conducted by Carson et al., (2016) (3) as part of the process for developing the Canadian 24-Hour Movement Guidelines for Children and Youth (2).

A total of 235 studies (194 unique samples) were included representing 1,657,064 unique participants from 71 different countries.

• A systematic review conducted by Okely et al., (2019) (4) undertaken to update Poitras et al., (2016) (1) and Carson et al., (2018) (3) as part of the development of the 2019 Australian 24-Hour Movement Guidelines for Children and Young People (5-17 years) (5). This report identified an additional 42 studies on physical activity, 32 on sedentary behaviour published through to July 2918 (4).

The GRADE tables developed from these updates were used as the basis for the commissioned update conducted for WHO.

• The systematic reviews conducted and synthesized as part of the development of the 2019 Canadian Guideline for Physical Activity Throughout Pregnancy (6). This consisted of 12 systematic reviews of over 25,000 related studies in English, Spanish and French language on maternal physical activity during pregnancy reporting on maternal, fetal or neonatal morbidity, or fetal mortality outcomes. Seven of these systematic reviews addressed outcomes deemed critical and important by the GDG (7-13).

The GRADE tables from these evidence reviews were used as the basis for the literature search conducted to update and inform the development of WHO recommendations.

• The scientific report of the Physical Activity Guidelines Advisory Group (PAGAC) (14) which provides a summary of a systematic update of evidence on physical activity and sedentary behaviours and health outcomes since 2008 through to 2016 to inform the development of the 2018 *Physical Activity Guidelines for Americans, 2nd Edition (15).*

The evidence summarised addressed a total of 38 main research questions and 104 sub-questions selected for their public health relevance. The evidence comprised results from systematic reviews comprising a total of 1,130 articles, which were each abstracted to answer the 38 research questions *(14)*.

The systematic reviews protocols utilized a modified version of "A Measurement Tool to Assess Systematic Reviews"

(AMSTAREXBP) to assess the methodological quality of systematic reviews and meta-analyses. Risk of bias, or internal validity, was assessed for each original study using an adapted version of the USDA NEL Bias Assessment Tool (BAT) *(16)*.

The new evidence identified in the updated searches conducted for these WHO guidelines is presented below and links are provided to report and supplementary materials of the PAGAC (14).

Methods for updating the evidence and data extraction

A search for systematic reviews and pooled analyses of cohort studies was conducted for studies published from the date of last searches conducted for each of the included reviews (listed above) up to September 2019 and standardized data extraction protocols, were developed and employed.

To update the searches conducted by Poitras et al., (2016) (1), Carson et al., (2016) (3), and Okely et al., (2019)(4) MEDLINE, EMBASE, PsycInfo, and SportDiscus databases were searched to identify reviews that were peer-reviewed, written in English or French. To update the searches conducted by PAGAC (14) PubMed, CINAHL and Cochrane databases were searched to identify reviews that were peer-reviewed, written in English.

Searches were performed with no restriction by country or country income status and inclusive of reviews addressing any subjective or objectively measured physical activity or sedentary behaviour. It was decided not to conduct searches in additional languages other than those of the original searches, due to resource constraint and previous experience in the field indicating that these searches yielded very few, if any additional reviews. Reviews that examined an association (based on levels above or below a threshold of physical activity or sedentary behaviour) and also reviews that explored the dose-response relationship between these and health-related outcomes were considered.

An external team of reviewers used the AMSTAR 2 (Assessment of Multiple Systematic Reviews) instrument to rate the credibility of the systematic reviews under consideration for inclusion (17). The AMSTAR 2 tool contains 16 items that relate to the planning and conduct of the review. The overall confidence in the results of each review was rated according to published guidance: a rating of "high" reflects that the review had zero or one noncritical weakness; "moderate" indicates the review was judged to have more than one noncritical weakness; "low" means the review was judged to have one critical flaw with or without noncritical weaknesses or multiple noncritical weaknesses; and "critically low" signifies that more than one critical flaw was present. One reviewer completed the AMSTAR 2 tool for all provisionally included reviews. Reviews that were rated critically low by one reviewer were reviewed by a second reviewer using the same tool. Reviews ultimately rated as critically low were excluded because they were judged to be too unreliable to provide an accurate and comprehensive summary of the available evidence, unless it was the only review available for a particular outcome.

This body of evidence also included pooled cohort studies. An external team of reviewers used the Newcastle-Ottawa Scale to assess the quality of those studies *(18)*. Each study was given a quality rating of good, fair, or poor quality. In general, a good-quality study met all criteria on the Newcastle-Ottawa scale. A fair-quality study did not meet, or it was unclear whether it met at least one criterion, but also had no known important

limitations that could invalidate its results. A poor-quality study had a single fatal flaw or multiple important limitations. Poor-quality studies were excluded.

There was an assessment for overlap, recognising potential for duplication of studies in multiple review. Reviews that contained redundant bodies of evidence, overviews-of-reviews and some pooled cohort studies were excluded where other reviews that were more comprehensive and/or recent were identified.

Methods for new reviews

Where gaps in existing evidence were identified, new umbrella reviews were commissioned. Reviews were commissioned to examine:

- 1. The relationship between occupational (i.e., work-related) physical activity and health-related outcomes(19); and
- 2. The association between leisure-domain physical activity and adverse health outcomes *(20)*.

For these two new reviews, searches were undertaken using PubMed, SPORTDiscus and Embase from 2009 to December 2019.

3. The association between physical activity and falls prevention.

This utilized the 2019 Cochrane Collaboration Systematic Review by Sherrington (*21*), and updated with evidence published to November 2019.

4. The association between physical activity and osteoporosis and sarcopenia.

The search for existing systematic reviews on osteoporosis and sarcopenia was conducted in PubMed for reviews published from 2008 up

to November 2019 identified no new reviews and eight new primary studies.

5. The evidence on associations between physical and health outcomes in people living with HIV.

A scoping review ascertained the availability of evidence on physical activity and health-related outcomes among people living with HIV to support conducting an umbrella review which was conducted for evidence published up to October 2019 using PubMed, CINAHL and Web of Science and no start date limitation.

Grading the Body of Evidence

The Grading of Recommendations Assessment, Development and Evaluation (GRADE) method was used to rate the certainty of the evidence for each PICO *(22)*. When available, the GRADE "Evidence Profiles" or "Summary of Findings" tables from each review were used as a starting point. If no table was available within the existing systematic reviews, Evidence Profile tables for each population and outcome of interest were constructed.

The GRADE method was used to rate the certainty of the evidence for each PICO (22) with the following criteria considered: study design, risk of bias, consistency of effect, indirectness, precision of effect, and other limitations, including publication bias and other factors for upgrading (magnitude of effect, dose-response, and effects of confounders).

Well-conducted longitudinal studies were upgraded to better reflect the certainty in findings regarding associations from such studies.

Studies that evaluated intermediate/indirect outcomes were not necessarily downgraded; the GRADE rating reflects the certainty in effects on those outcomes.

In some cases, the GRADE ratings from existing reviews were modified to ensure consistency in how GRADE methods were applied.

The certainty in the body of evidence for each outcome was assigned based on the following guidance (23):

- **High** :We are very confident that the true effect lies close to that of the estimate of the effect
- **Moderate**: We are moderately confident in the effect estimate. The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
- **Low**: Our confidence in the effect estimate is limited. The true effect may be substantially different from the estimate of the effect
- **Very low**: We have very little confidence in the effect estimate. The true effect is likely to be substantially different from the estimate of effect.

certainty of evidence, relative values of patients for desirable and undesirable outcomes, resource use (cost considerations) where applicable, potential impact on inequities in health, acceptability and feasibility of recommendations.

The GDG considered the body of evidence in totality for each recommendation for all critical and important outcomes. For a particular exposure/intervention and outcome link, studies differed widely in the specific exposure/intervention assessed, outcomes assessed, study design, and analytic methods, resulting in heterogeneity in the available evidence. Therefore, it was not possible to apply the classic GRADE approach to each specific exposure/intervention and outcome link; rather, GRADE was applied for the overall body of evidence addressing each exposure/intervention and outcome link, across study design types and variations in exposure/intervention measurements and analyses. When these factors resulted in concerns regarding the coherence of the evidence (in other words, that the evidence for a particular exposure/intervention and outcome link did not fit together when looked at in different ways), the panel downgraded the certainty of evidence(24).

Going from evidence to recommendations

The GDG employed the GRADE Evidence to Decisions (EtD) framework



https://www.yunbaogao.cn/report/index/report?reportId=5_24244

