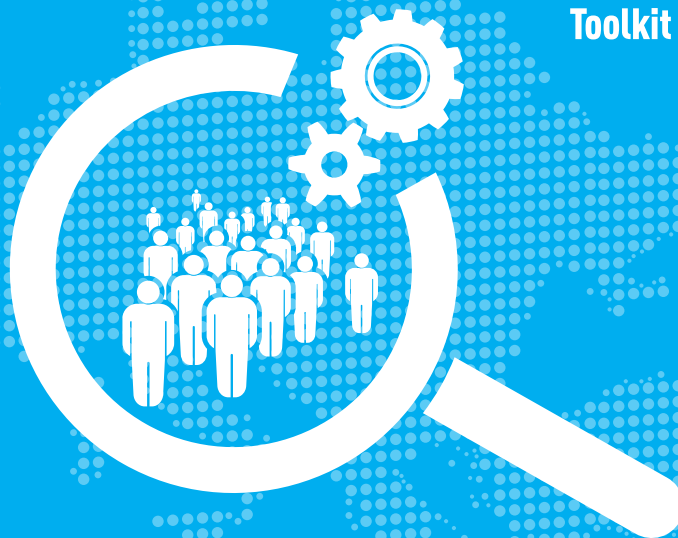


EU PAS MOS

Toolkit Manual



[FINAL VERSION // FEBRUARY 2021]



Co-funded by the
Erasmus+ Programme
of the European Union



EUROPEAN UNION
PHYSICAL ACTIVITY
AND SPORT
MONITORING SYSTEM

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- TAFISA – The Association For International Sport for All
- ISCA - The International Sport and Culture Association
- EuropeActive, the European Health and Fitness Association (EHFA)
- Institute of Sport Science and Sport
- The European Cyclists' Federation
- Federation of the European Sporting Goods Industry



THE PROJECT

The aim of the EUPASMOS is to implement a harmonized monitoring system for physical activity and sport, through the development of an integrated and shared methodological process that will provide comparable, valid and reliable physical activity and sport participation data across EU Member States. This will support Member States, the European Commission, the WHO and other relevant organizations in the design, promotion, implementation and surveillance of effective, evidence-based HEPA and sport policies and strategies across Europe and different governance levels.”



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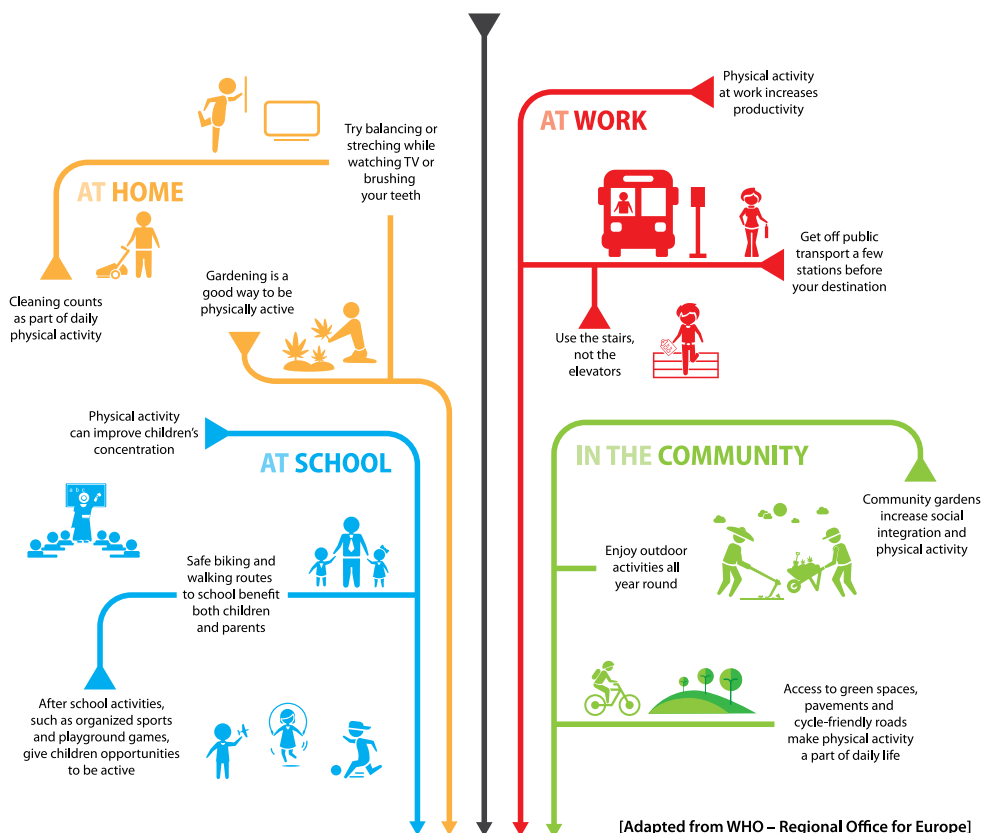
WHY

Why are sport and physical activity important for public health?

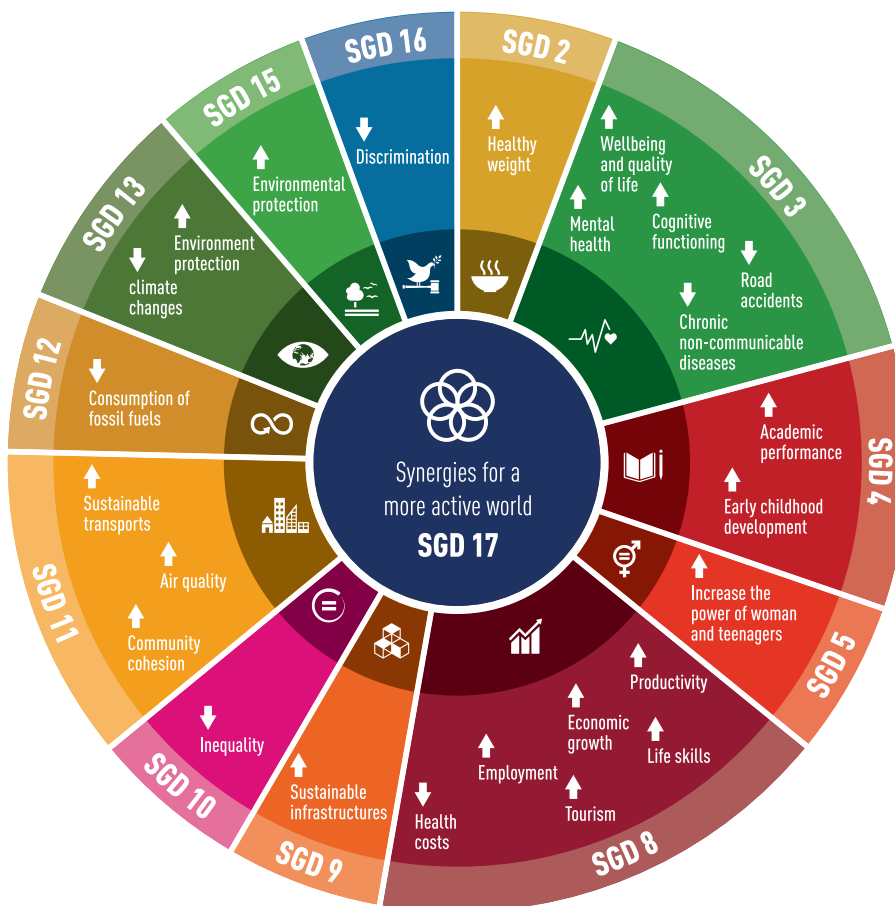
Evidence has been demonstrating that practicing of sport and physical activity on a regular basis contributes to the prevention and treatment of several chronic non-communicable diseases such as obesity, diabetes mellitus, cardiovascular, rheumatologic and respiratory diseases, and cancer. In addition, they are crucial to citizens' mental health, improving their quality of life and wellbeing.

Taking into consideration that in the Europe Region, physical inactivity is increasingly responsible for a growing morbidity and mortality rates, it is relevant that governmental and non-governmental institutions, at the European, national as well as the local level, promote structured and coordinated strategies to increase sport and physical activity participation.

These strategies should be at the forefront of the interventions that need to be developed to decrease both health care and social costs, reduce pressure on health systems, and foster a sustainable development respecting the United Nations Sustainable Development Agenda for 2030. In this context, monitor the progress and the impact of the implemented policy measures related with sport and physical activity at different governance levels is determinant to make the necessary adjustments.



**REGULAR PHYSICAL ACTIVITY THROUGHOUT THE LIFE-COURSE
ENABLES PEOPLE TO LIVE BETTER AND LONGER LIVES**



1. IMPACT OF SPORT AND PHYSICAL ACTIVITY ON PUBLIC HEALTH

Sport and physical activity are associated with numerous benefits, not only at an individual level, but they also have a huge impact on the economic, social and cultural development of our societies. Based on the recent UN Sustainable Development Goals (SDGs) agenda until 2030, it is clear that both sport and physical activity can represent a relevant role towards achieving many of the defined objectives. Indeed, along with the fact of being a core component of SDG 3 (health and well-being), sport and PA also contribute to the SDG identified in the previous figure.

2. NEED FOR A MONITORING FRAMEWORK

According to the WHO, two-thirds of the adult population of the EU do not reach the recommended levels of activity. As a result, physical inactivity is estimated to deprive Europeans of over 8 million days of healthy life every year, on average, and is responsible for around 1 million deaths. Monitoring PA and sport participation is a key prerequisite for designing effective policies and interventions for the prevention of NCDs, to improve the sustainability and safety of our cities and communities and for promoting inclusion and development.

The Council of the European Union acknowledged that the publication of contradictory data on physical activity levels and sport participation resulting from different survey instruments is a relevant obstacle to the design of better and adjusted policies to promote sport and physical activity which needed to be addressed on an European level.

In this sense, the Council has encouraged Member States (MS) to extend and deepen the cooperation among them and with the European Commission and WHO – Regional Office for Europe to overcome this situation and develop a reliable and efficient surveillance and monitoring system. This system should be able to provide valid and comparable information, contributing to support the implementation of the Council recommendations in each MS and help them to evaluate national policies, strategies and action plans to promote sport and physical activity regular participation.

Based on this recommendations, and taking into consideration that in Europe there is a wide variety of monitoring systems with low comparability, a large group of EU MS agreed to contribute to the development of the European Union Physical Activity and Sport Monitoring System (EUPASMOS).

3. EUPASMOS PROJECT CONTRIBUTION

A system based on valid instruments to monitor physical activity and sport must provide data to increase the existing knowledge of the effectiveness of different approaches to promote physical activity levels and sport participation, enabling all involved policy makers to design better cost-effective policies and action plans, while sharing and communicating these results between EU MS. The EUPASMOS project developed a new integrated monitoring framework based on comparable, valid and reliable data, contributing to strengthening surveillance across MS and different HEPA sectors. It provides valuable information at all governance levels to improve policy definition and practical interventions to promote PA and sport participation, respecting equitable access and fostering social inclusion.

In order to identify the EU “landscape” regarding available validated questionnaires to assess physical activity in adults, EUPASMOS team has developed a Systematic Review and Meta-Analysis which is available for consultation in the following link:

[Sember, V. et al 2020. Int. J. Environ. Res. Public Health 2020, 17\(19\), 7161;](#)

In addition, the EUPASMOS team has also developed a systematic review and meta-analysis to identify the validity and reliability of sedentary behavior questionnaires:

[Meh, K. et al 2021. Int. J. Environ. Res. Public Health 2020, 17\(19\), 7161;](#)

EUPASMOS team developed also, in the hungarian cohort of the project, a criterion validity and reliability of the IPAQ short form against the RM42 accelerometer:

[Ács, P. et al 2021. BMC Public Health 2021, 21\(Suppl 1\):381](#)

DOWNLOADS

➤ [Validity and Reliability of International Physical Activity Questionnaires for Adults across EU Countries: Systematic Review and Meta Analysis](#)

- [*Validity and Reliability of IPAQ-SF and GPAQ for Assessing Sedentary Behaviour in Adults in the European Union: A Systematic Review and Meta-Analysis*](#)
- [*Criterion validity and reliability of the International Physical Activity Questionnaire – Hungarian short form against the RM42 accelerometer*](#)
- [*Physical activity factsheets for the 28 European Union Member States of the WHO European Region. Overview \(2018\)*](#)
- [*Global Action on Physical Activity 2018-2030 – WHO*](#)

FURTHER READING

- [*Benefits of Physical Activity – Center for Disease Control, USA*](#)
- [*Netherlands' physical activity guidelines 2017*](#)
- [*WHO guidelines on physical activity and sedentary behaviour*](#)

WHAT

What needs to be done to develop a physical activity and sport monitoring system at EU level?

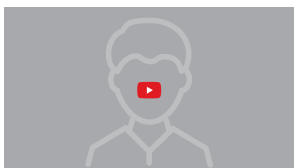


- 1.** Cooperation between EU Member-States, European Commission, WHO, and international and national stakeholders – developing an EU-wide physical activity and sport monitoring system implies the development of a transnational cooperation network between public and private organizations from different governance levels, working collaboratively to achieve similar objectives.
- 2.** Common framework development and validation of measurement instruments in different EU Member-States – an EU monitoring system requires the development of a common framework including multiple validated measurement tools to assess sedentary behaviour, PA and sport participation across the EU MS, using nationally representative samples.
- 3.** Development of specific software tools to process data analysis – an EU monitoring system should develop a specific custom-made software to analyze the data collected. This tool should be available to all EU MS and other stakeholders using the approved framework.
- 4.** Deepen the analysis of sedentary behavior patterns, physical activity levels and sport participation of the European citizens – the monitoring system advances stakeholders' knowledge on citizens' sedentary behaviour, PA and

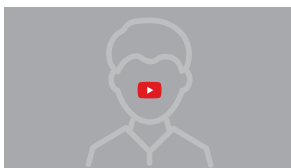
sport prevalence data, supporting more comprehensive analysis and reliable comparisons, promoting the development of adjusted HEPA and sport policies and actions.

5. Toolkit development to build and improve stakeholders' capacity – producing a customized toolkit in order to help EU MS, European Commission, WHO and all international and national stakeholders' to better understand and process the collected data. Additionally, the toolkit support the replication of the methodology used in further surveys developed at different levels (national, regional and local level, addressing, for example, specific population groups).
6. Data collected will be included in the physical activity section of the WHO database - European Health Information Gateway.
7. It can contribute to the dissemination of information related to PA and sport participation among EU MS population, sport and health sector agents, professionals, scientific and academic community, public and civil society organizations.

VIDEO TESTIMONIAL



Tibor Navracsics
Former European
Commissioner for Education,
Culture, Youth and Sport



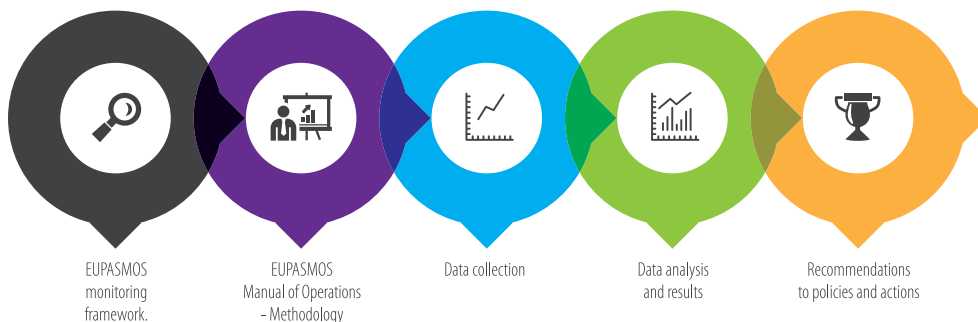
João Paulo Rebelo
Former Portuguese State
Secretary of Youth and Sport

What are the main achievements of the EUPASMOS project?

- 1.** For the first time in the sport sector at EU level, several MS public organizations, reliable scientific partners, civil society and internationally relevant sport and health stakeholders worked collaboratively in a transnational project to develop a standardized EU-wide sedentary behavior, physical activity and sport monitoring system.
- 2.** The project provides updated sedentary behavior, and sport prevalence data from EU MS, enabling the adjustment and refinement of relevant HEPA and sport policies.
- 3.** EUPASMOS provides MS guidance and capacity building to implement national monitoring systems in line with the EU system through the publication of a toolkit and online resources that can be used by all MS and partners.
- 4.** This enables data comparison between countries, improving validity and reliability of the existing data collected using a wide range of different instruments (e.g. Eurobarometer, EHIS – wave 3, IPAQ-SF, GPAQ, and national questionnaires).
- 5.** EUPASMOS contributes to develop the physical activity section of the WHO database - European Health Information Gateway.
- 6.** This enables the development of more cost-effective and evidence-based policies and actions to tackle sedentary behavior and promote physical activity and sport participation among all segments of the EU population.



Even the smallest effort makes an impact



The Council Recommendation on promoting HEPA across sectors encouraged MS to cooperate closely by engaging in a process of regular exchange of information and best practices. The EUPASMOS project responded to that invitation by involving several MS in a process of data collection and tool validation to establish a best practice standard in data monitoring which can be used by all EU MS.

Furthermore, collected data and results will be exchanged between partner organisations and then shared in the form of national and international publications, as well as within the WHO European Health Information Gateway, making the information readily available to all MS and other international and national stakeholders.

HOW

How is it done? Important steps to get started:

1. Read carefully the EUPASMOS Manual of Operations;
2. Make sure you have all the necessary material to implement the project (translated and validated questionnaires, material for anthropometric data collection, and accelerometers);
3. If questionnaires are not validated in your country language, develop a validation process as described in the EUPASMOS Manual of Operations (Chapter 2.7. Methodological process for the 1st phase);
4. In order to ensure a large, representative, and sufficiently heterogeneous sample, it's important to develop contacts with a wide range of institutions and involve hard-to-reach groups, Public organizations (national governmental bodies, national statistic bureaus, national, regional and local public authorities), schools, day care centers (for elderly citizens), and individual participants could be contacted; social media could be a relevant support to disseminate the project and increase sample size;
5. Create an objective plan and a concrete timeline to implement the survey and collect data;
6. Before start data collection, train all team members regarding the methodology procedures;

7. Before start data collection, ensure that all the measurement instruments, questionnaires (online, preferably) and accelerometers are available;
8. Regarding accelerometers, the delivery and fitting to the participants should be done personally by a team member. Make sure that participants have no doubts about any technical procedure to be developed during the 7-day monitoring period;
9. After this 7-day monitoring period, ensure all the necessary conditions to receive the accelerometers and download the data. Additional questionnaires can be also applied at this moment.

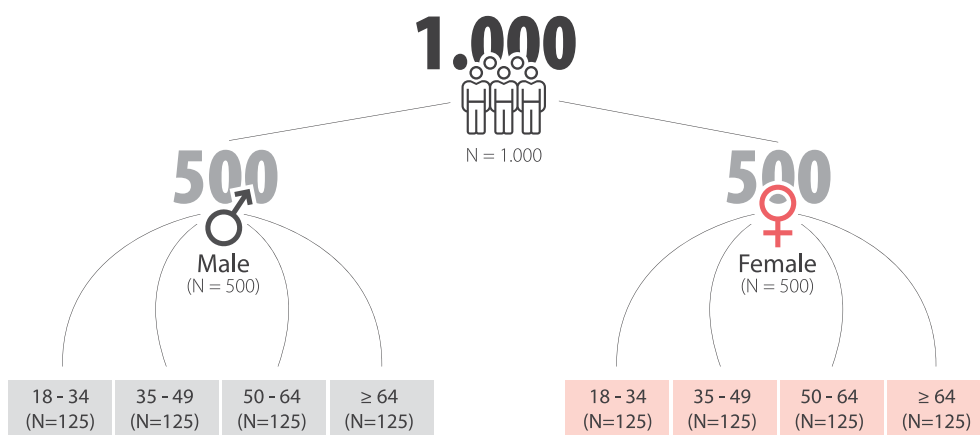


Methods

SAMPLE SIZE AND REPRESENTATIVENESS

Age, sex, and socio-economic status are relevant determinants for sedentary behavior, physical activity levels and sport participation. The number of participants included in the sample should consider the country's total population and their distribution at the different country regions, taking also into account age, sex, and socio-economic status.

- At national level surveys, aim to include a sample of, at least, 1000 individuals;
- Sample distribution should be adjusted according to the country population distribution:
 - ⌋ Sex (e.g. 50% men/50% women);
 - ⌋ Age groups (18-34, 35-49, 50-64, and >65 years-old);
 - ⌋ Socio-economic status;
- Aim to include adults and older adults, people with locomotor disabilities, and pregnant women;



Legend: Example of a sample distribution.

PARTICIPANTS' CODIFICATION



Participants codification is a relevant step in this data collection process. The EUPASMOS Manual of Operation (Chapter 2.2. Participants' codification) clearly describes an example to organize this task:

1. Each participant should be associated to a specific personal code;
2. This personal code could start with a number that identifies the code for country of assessment (or region, for national surveys), a second number that designates the code for sex, and a third number that identifies the code for the age group category;
3. The rest of the specific personal code of each participant represents his/her number according to the order of measurement, using a cumulative 4-digit code.

ANTHROPOMETRIC DATA

Weight, height, waist and hip circumference should be measured according to standardized procedures described in the EUPASMOS Manual of Operations (Chapter 2.3. Anthropometric data).

- **Weight:** Participants should be weighed with a digital scale to the nearest 0.01 kg;
- **Height:** Participants should be measured to the nearest 0.10 cm using a calibrated stadiometer;
- **Body Mass Index:** BMI is calculated as body mass (kg) divided by height squared (m^2);
- **Waist circumference:** Participants should be measured with a flexible anthropometric tape at minimal respiration and reported to the nearest 0.10 cm;
- **Hip circumference:** Participants should be measured with a flexible anthropometric tape and reported to the nearest 0.10 cm;

Participants need to be measured three times and the three values should be averaged to limit the intra-experimental variability. Trained technicians should be preferred to perform anthropometric measurements. Calculation of intra- and inter-coefficients of variation between technicians is strongly advised.

Note: When not measured for any valid reason, weight and height can be reported by the participant.



QUESTIONNAIRES

1. Check if there is a translated version of the survey questionnaires in the corresponding language of your country;
2. If possible, prepare the questionnaire application using a digital support platform complying with GDPR;
3. Test the online form before starting to collect the data in order to correct any problems that may occur;
4. If possible, prefer applying the questionnaires face to face with the participant;
5. Do not abbreviate the questions; use all the text as stated in the original version.

Questionnaires used in EUPASMOS framework to collect data about socio-demographic and health status, sedentary behavior, physical activity and sport participation:

- **European Health Interview Survey - Wave 3 (EHIS):** participant's socio-demographic data, health status, and physical activity levels were collected using questions derived directly from the EHIS questionnaire. This questionnaire is being used in Europe for quite long and is part of the EUROSTAT system to collect the above mentioned data;
- **International Physical Activity Questionnaire (IPAQ-SF):** IPAQ assesses total physical activity level by collecting information on the number of days and the duration of vigorous-intensity, moderate-intensity and walking in periods of at least 10 continuous minutes; sedentary behavior regarding sitting time is also measured;
- **Global Physical Activity Questionnaire (GPAQ):** collects information on physical activity participation in three domains (work, transportation, and recreational) as well as overall sedentary behavior;
- **Eurobarometer - Sport and Physical Activity Questionnaire:** this questionnaire measures the frequency and levels of engagement in organized exercise or sports activities, recreational or non-sport-related physical activities, vigorous and moderate physical activity, walking, and sitting time.

Questionnaires used to collect data about sport and physical activity correlates and determinants:

- **Short Form-36 Health Survey (SF-36)** - The SF-36 is a questionnaire originally designed to measure health status and is often used as a measure population's quality of life. The questions reflect 8 domains of health, including physical functioning, physical role, pain, general health, vitality, social function, emotional role, and mental health.
- **Neighborhood Environment Walkability Scale Confirmatory Factor Analysis (NEWS-CFA)** – This questionnaire accesses residents perception of neighborhood design features related to physical activity, including residential density, land use mix, street connectivity, infrastructure for walking/cycling, neighborhood aesthetics, traffic and crime safety, and neighborhood satisfaction.



ACCELEROMETRY

The accelerometers objectively measure physical activity and sedentary behavior. EUPASMOS used the UKK RM42, a lightweight triaxial accelerometer that should be used on the right hip, near the iliac crest and under the clothes (can be in direct contact with the skin) during the waking hours (excluding the time spent in water activities) and on the wristband (non-dominant hand) during the sleep time. Using recent algorithms to process data, it has the ability to discriminate different types of sedentary behavior (e.g. sitting, standing and sleeping).

Considering the widely used and previously validated criteria of 600 minutes (10 hours) to define a valid day, a minimum of 10 hours of wear time when collecting data should be respected. However, and taking into consideration the recent published 24-h recommendations for physical activity and sedentary behaviour, the **EUPASMOS** framework **recommended** to each participant a **24 hours per day wear time**.





Practical Recommendations

In this section of the EUPASMOS toolkit it is described the main practical recommendations that will help guiding the implementation of the PA and sport monitoring system in your country, region or local community.

Each step of the process is presented in an at-glance approach to ensure readiness for data collection and analysis, supporting the development of more adjusted policies and actions in Sport and Physical Activity promotion at different governance levels.



Planning

Planning is one of the most relevant phases when preparing the implementation of a PA and sport monitoring survey. The main issues that should be taken into consideration are as follows:

1. Read carefully the EUPASMOS Toolkit and Manual of Operations;
2. Make sure you have all the necessary materials to implement the survey (validated questionnaires, equipment's for anthropometric data collection, and accelerometers);
3. If questionnaires are not validated in your country language, develop a validation process as described in the EUPASMOS Manual of Operations;
4. Contact a wide range of institutions to ensure the largest possible representative sample for your survey; use different communication platforms to increase project dissemination;

5. At national level surveys, aim to include a sample of, at least, 1000 individuals;
 - a. Sample distribution should be balanced according to the country population distribution:
 - i. Sex (e.g. 50% men/50% women);
 - ii. Age groups (18-34, 35-49, 50-64, >65 years-old);
 - iii. Socio-economic status;
 - iv. Pregnant women and people with locomotor disabilities;
6. For smaller and specific population surveys, aim also to enrol a balanced sample distribution accordingly;
7. Create an objective plan and a concrete timeline to collect data;
8. Train all team members regarding the methodology procedures;
9. On the first day of data collection ensure that all the measurement instruments are available;
10. Accelerometer delivery to each participant should be done personally by a trained survey team member;
11. After the 7-days monitoring period (using the accelerometer), ensure all the necessary conditions to receive the equipment's and download the data.
12. If necessary, additional questionnaires can be also applied during this second contact moment with the survey team;
13. Ensure that all participants receive the reports resulting from data collection and analysis timely.

DOWNLOAD

↘ [EUPASMOS Informed consent](#)



QUESTIONNAIRES

- Check if there is a translated version of the questionnaires in your country language;
- If yes, download the version to be administered during the survey;

- ➔ If it is not translated, the survey team should find a specialist to translate the questionnaire;
- ➔ After the questionnaire translation, the team must run a test-retest procedure using, at least, 20 participants; the procedures are described in the EUPASMOS Manual of Operations;
- ➔ After the test-retest validation, questionnaire is ready to be used according to the EUPASMOS framework.

Questionnaires used by EUPASMOS to measure PA and sport participation:

- [*International Physical Activity Questionnaire – Short Form \(IPAQ - SF\)*](#)
- [*Global Physical Activity Questionnaire \(GPAQ\)*](#)
- [*European Health Interview Survey - Wave 3 \(EHIS - Wave 3\)*](#)
- [*Eurobarometer - Sport and Physical Activity Questionnaire*](#)

Questionnaires used by EUPASMOS to measure PA and sport correlates and determinants:

- [*The Short Form-36 Health Survey \(SF-36\)*](#)
- [*Neighbourhood Environment Walkability Scale - Confirmatory Factor Analysis \(NEWS - CFA\)*](#)

Additional questionnaires can be applied to assess health status and socio-demographic information from the participants in the survey. For these purposes, EUPASMOS framework used the EHIS questionnaire (Wave 3), which is the instrument used by the EUROSTAT at European level to collect this information. Both questionnaires are presented in the EUPASMOS Manual of Operations.

- [*European Health Interview Survey - Wave 3 \(EHIS – Wave 3\)*](#)



QUESTIONNAIRES



// Anthropometric measurements
// Sociodemographic information
// Body composition

DOWNLOAD

- [IPAQ - SF](#)
- [GPAQ](#)
- [EHIS - Wave 3](#)
- [Eurobarometer - Sport and Physical Activity Questionnaire](#)
- [SF-36](#)
- [NEWS-CFA](#)

EUPASMOS questionnaires validated in partner's language:

- [Questionnaires in all project languages](#)



ACCELEROMETRY

To objectively measure physical activity levels, EUPASMOS used the UKK RM42 tri-axial accelerometer along with a new method to process the raw data collected. Other validated models of triaxial accelerometers, using the MAD-APE algorithms to process raw data can be used.



Legend: UKK RM42 triaxial accelerometer.

Main steps and procedures to be followed:

- Deliver, personally, the accelerometer to the participant (preferably);
- Give all the instructions to the participant about how to wear the device during awake and sleep time (24-h, except for water based activities, during 7 consecutive days, including 2 weekend days);
- Match participant codification with the accelerometer device code;
- Identify participant responsibilities and tasks;

- Preferably, receive the accelerometer directly from the participant after the measurement period.

Participants are required to record, in an accelerometer idle diary, all occasions that they removed the device and identify the reason. A template specific form is available from EUPASMOS framework.

Whenever possible, it is suggested to complete the information about the physical activity developed and sport participation by asking participants to fill out a physical activity diary. This diary will help to discriminate more precisely the activities performed during the period of data collection.

DOWNLOADS

- ↳ [Accelerometer Idle Diary Form](#)
- ↳ [Physical Activity Diary Form](#)

FURTHER READING

- ↳ [EUPASMOS Manual of Operations](#)



ANALYSIS

Within the EUPASMOS framework, it is suggested to develop specific procedures for data analysis.

QUESTIONNAIRES

- ➔ If the questionnaires used to collect data in your country are not translated and or validated, a test-retest procedure, as described in EUPASMOS Manual of Operations should be performed previously to data collection (using, at least, 20 participants);

- Statistical procedures to develop the assessment of questionnaire validation should be developed as described in the referred Manual;
 - Acceptability, exploratory factorial analysis, internal consistency, reproducibility, and convergent validity are some of the main procedures that can be developed.
- If the questionnaires used to collect data in your country are already translated and or validated, the survey team can proceed with data collection.
- After data collection, databases should be filled. In order to ensure the best possible quality of data, any database should be cleaned from errors and outliers.
 - EUPASMOS developed a specific software tool to analyse databases and identify errors and outliers;
 - Develop the necessary cleaning procedures in your databases.
- After cleaning the databases resulting from questionnaires application, several analysis procedures can be performed:
 - Control for normality and homoscedasticity of the study variables;
 - When necessary, log transformations to normalize distributions can be used;
 - Calculate means $\pm$ standard deviations;
 - Multiple linear regressions models, adjusted for confounding variables, should be performed to study the independent associations between key variables like age, sex, BMI and other socio-demographic or health markers with relevant physical activity, sport and sedentary behaviour variables;
 - In order to facilitate the comparisons of the results obtained in the multiple linear regression models, standardized beta coefficients should be presented;
 - To determine how much the independent variables are linearly related to one another, the multicollinearity should be studied by statistic tolerance ($1-R^2$), being the stability of the regression model disturbed by multicollinearity if tolerance is inferior to 0.1.
 - Statistical significance should be set at $P < 0.05$.



ACCELEROMETRY

EUPASMOS used the mean amplitude deviation (MAD) method to process the accelerometer raw data, which can be applied to different accelerometer brands and seems to present high validity for estimating all physical activity intensities including the different types of sedentary behaviours.

For harmonization reasons, the accelerometer data processing was performed by automatic algorithms that were already included in the EUPASMOS cloud provided by UKK (Finnish project partner). Each country's data were uploaded to this cloud and, after an automatic process, the files containing the raw data were shared with each survey partner and then with the project coordination centre, in Lisbon.

If, in other surveys, different models of accelerometers are used, the manufacture company, normally, provides a specific software to analyse the data collected and to export the raw output variables.

In both cases, data analysis should include:

- Control for normality and homoscedasticity of the study variables;
- When necessary, log transformations to normalize distributions can be used;
- Calculate means $\pm$ standard deviations;
- Multiple linear regressions models, adjusted for confounding variables, should be performed to study the independent associations between key variables like age, sex, BMI and other socio-demographic or health markers with relevant physical activity and sedentary behaviour variables.

Project Partners



Bulgarian Ministry of
Youth and Sports
(Bulgaria)



Cyprus Sport
Organization
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Université Clermont-
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Hungarian Leisure
Sport Organization
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Italian People's Sports
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HEPA Macedonia National
Organization for the Promotion
of Health-enhancing Physical
Activity
(Republic of North Macedonia)



National Research
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HELLENIC REPUBLIC
MINISTRY OF CULTURE AND SPORT
GENERAL SECRETARIAT OF SPORT

Ministry of Culture
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Associate Collaborative Partners



Co-funded by the
Erasmus+ Programme
of the European Union