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Physical Activity Self-Reports: Past or Future?

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The measurement of physical activity (PA) is fundamental to health-related research, practice, and policy. For decades, self-report measures have provided unique insights into the role of PA for human health and society. In fact, studies, in which participants reported their behaviours – or the behaviours of others – using diaries, logs, questionnaires, and recalls, have historically provided the evidence that underpins global PA guidelines.¹ Self-

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reports have been used extensively in various settings, including population surveillance, observational and intervention studies, and routine assessment as part of health care.

The field of PA measurement is rapidly evolving. We have a wealth of measurement instruments and achieved remarkable advancements in the use of device-based information such as raw accelerometry, novel algorithms for pattern recognition and worldwide initiatives for data harmonisation.²³ The technological evolution has changed the practice of PA self-reports as well, and led to electronic surveys and ecological momentary assessments (EMAs) for the measurement of PA in natural environments and in ‘real-time’.

Despite significant improvements, an established standard for the measurement of PA does not exist due to the complexity of the behaviour.⁴ PA is multifaceted and encompasses different domains (e.g., leisure, occupation, transport, household), dimensions (e.g., frequency, duration, intensity, type), correlates and determinants (e.g., where, when, why, with whom). Therefore, the appropriateness of any measure depends on the prioritised facets of PA, study aims, target population, feasibility, measurement properties and more.⁵ It is the diversity of purposes which precludes a one-size-fits-all solution; rather an instrument has to be ‘valid for a particular purpose’.⁴

Is there a role for self-reports?

Recent advancements with wearable devices have challenged the role of self-reports. Our field has generally adopted a hierarchy of measurement, with devices considered as superior instruments by definition (albeit this depends on the purpose).⁴ Who would like to use an instrument thought by many to have low validity? The belief that self-reports are often considered inferior may leave researchers, clinicians and public health workers wondering: Can we still use self-report measures? And if so, for which purposes are they essential?

In our opinion, self-reports will continue to fill important roles now and in the future. Not recognising self-reports as valid, flexible, and efficient PA measurement tools means that we will lose an important part of the bigger picture. Self-reports, as the primary measure of a person’s perception of their PA, are essential in several areas, depending on the purpose of data collection. Table 1 shows the areas in which our group supports the use of self-report measurements of PA. The major strengths of self-reports lie in the cost-effective collection of information about types and domains of PA, in large-scale applications (e.g., population surveillance, evaluation of public health interventions) and in the promotion of PA in healthcare settings.

Understanding the limitations of self-reports

Clearly, the weaknesses of self-reports (e.g., reporting errors, the need to be population-specific) are well known, and limit their use in some settings.⁶ For example, problems occur among populations that may have problems with the understanding and interpretation of questions (e.g., young children, people with dementia, certain mental disorders or low literacy levels); in settings when a tool is used to measure change in PA although it is not responsive to change; and in the comparison and synthesis of results (e.g., some questions, like ‘participation in organised sports’, are not relevant for certain populations or cultures).⁷

Lastly, poor measurement quality or a lack of evidence for sufficient measurement quality in the target population may render a self-report tool unsuitable for use, even though the opposite has frequently occurred in the past.⁸

Future perspectives of self-reports

Carefully selected self-reports will still be needed in several areas. In addition, the combination of PA information from different sources and electronic modes of data collection will be essential to extend our understanding of human behaviours and their implications for health. Richer data sources are crucial to study complex phenomena such as the currently debated ‘physical activity paradox’.⁹ Therefore, we should work on approaches to better connect self-reported data with physiological and movement-related signals (e.g., accelerometry, heart rate, Global Positioning Systems [GPS]). For example, calibration of self-reports (e.g., within network harmonisation) can help bridge the data from self-reports and devices as well as improve their accuracy and utility.¹⁰ The combination can also be valuable for measuring behaviours which are poorly captured by a single tool (e.g., cycling for a purpose). Finally, the electronic application of short-term instruments (e.g., time use diaries, EMAs, previous day recalls), for example via smartphones, can increase our knowledge about the health-related dynamics of daily behaviours, such as sleep, sedentary behaviour, and light-intensity activities, as well as the settings ‘surrounding’ these behaviours.

In summary, our field at times may have shaped a false hierarchy of PA measurement (devices are ‘more valid’ than self-reports) which may have ultimately influenced the selection of instruments.⁴ However, it is the combination of the strengths of different instruments (e.g., self-reports and devices) which is needed to provide a holistic picture of PA. Each instrument has its specific strengths and limitations. This implies it is highly important to assess each instrument’s value for a particular purpose. With no doubt, the endeavour to improve the quality of measurement will continue, and self-report will retain an important role in the measurement of PA.

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Areas for The technological evolution has changed the practices of PA

Table 1

Area	Example
Monitoring and surveillance of PA in populations	A questionnaire for surveillance to assess national/international PA levels
Screening and promotion of PA in health care	In general practice, a short questionnaire administered to patients to determine whether they are sufficiently physically active
Assessing changes in specific targeted behaviours in intervention studies	An electronic diary to obtain information about bicycling, swimming, or resistance training, which are not well captured by wearable devices, before and after the intervention (which aimed to increase one or more of these behaviours)
Identifying determinants and settings of PA which are amenable to intervention	EMA to obtain information about environmental (e.g., activities in green spaces) and social (e.g., being active with friends) aspects of the behaviour. The collected information can help to inform intervention targets
Evaluation of large-scale public health interventions	To evaluate if the prevalence of active commuting has changed in response to changes in local infrastructure
Determining associations of PA with health/disease outcomes in observational studies	A detailed questionnaire to investigate whether leisure time PA is associated with disease risk
Providing information about types of activities	A log to assess bicycling, swimming, or resistance training, which are not well captured by wearable devices
Providing information about domain-specific behaviours	An electronic time use diary to record times when people are active at work and in leisure time as well as types of activities associated with each domain
Providing information about historical PA levels	A detailed interview to assess past-year or lifetime leisure time PA (Note, it is not possible to go back in time, and therefore, not possible to assess post-hoc PA levels with wearable devices)
Providing information about the social, psychological, and environmental context of the behaviour	EMA to assess with whom (e.g., friends) and where (e.g., school) individuals are active and whether the activities are associated with specific emotional responses (e.g., positive mood)

EMA, ecological momentary assessment; PA, physical activity