



Contents lists available at ScienceDirect

## Journal of Exercise Science &amp; Fitness

journal homepage: [www.elsevier.com/locate/jesf](http://www.elsevier.com/locate/jesf)

## Results from Portugal's 2022 report card on physical activity for children and youth

Andreia Pizarro <sup>a, b, \*</sup>, José Miguel Oliveira-Santos <sup>a, b</sup>, Rute Santos <sup>f, g</sup>,  
 José Carlos Ribeiro <sup>a, b</sup>, Maria Paula Santos <sup>a, b</sup>, Manuel Coelho-e-Silva <sup>c</sup>,  
 Armando M. Raimundo <sup>d</sup>, Luís B. Sardinha <sup>e</sup>, Jorge Mota <sup>a, b</sup>

<sup>a</sup> Research Centre in Physical Activity, Health and Leisure, Faculty of Sport, University of Porto, Portugal

<sup>b</sup> Laboratory for Integrative and Translational Research in Population Health, Rua das Taipas 135, 4050-600, Porto, Portugal

<sup>c</sup> University of Coimbra, FCDEF, Portugal

<sup>d</sup> Universidade de Évora, Escola de Saúde e Desenvolvimento Humano – Departamento de Desporto e Saúde, Comprehensive Health Research Centre (CHRC), Portugal

<sup>e</sup> Exercise and Health Laboratory, CIPER, Faculty of Human Kinetics, University of Lisbon, Portugal

<sup>f</sup> Research Centre in Child Studies, University of Minho, Portugal

<sup>g</sup> Institute of Education, University of Minho, Portugal

## ARTICLE INFO

## Article history:

Received 29 November 2022

Received in revised form

30 April 2023

Accepted 18 May 2023

Available online 29 May 2023

## Keywords:

Physical activity

Surveillance

Epidemiology

Global matrix 4.0

## ABSTRACT

**Background:** The purpose of this study is to update results of Portuguese's Report Card on Physical activity (PA) for Children and Adolescents.

**Methods:** The grades were assigned by results derived from the PA and Fitness in Portugal 2021 Portuguese Report Card and corresponds to the third report for the Portuguese children and adolescents. It includes indicators of PA and sedentary behavior (SB) that are common to the GLOBAL matrix 4.0: Overall Physical Activity, Organized Sport and Physical Activity, Active Play, Active Transportation, Sedentary Behaviors, Family and Peers, School, Community and the Environment, Government and Physical Fitness. The search focused on published national evidence/data sources (academia, NGO, governmental) from end 2018 onwards excluding data obtained during the covid-19 pandemic.

**Results:** The grades were assigned as follows: Overall PA (D<sup>-</sup>), Organized Sport Participation (C<sup>-</sup>), Active Play (D<sup>+</sup>), Active Transportation (D<sup>-</sup>), Sedentary behaviors (C<sup>+</sup>), Physical Fitness (C), Family and Peers (B), School (A), Community and Environment (B), and Government (B).

**Conclusion:** In line with previous Portuguese Report Cards, a large proportion of Portuguese children and adolescents are not sufficiently active nor fit enough setting urgency for effective strategies. Particular attention should be given to Active play, Active transport and Organized Sports Participation has their grades have decreased. Some actions in selected indicators as Governmental and policy seems promising however results weren't seen yet. Despite the strong support of schools with mandatory curricula in PE no correspondent change is observed in fitness or PA, so more research is needed to find why.

© 2023 The Society of Chinese Scholars on Exercise Physiology and Fitness. Published by Elsevier (Singapore) Pte Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## 1. Introduction

Children and adolescents' physical activity and sedentary behavior is of particular relevance for lifelong health. So, understand it's trends through the years and how policies and interventions can

affect it is crucial for population health promotion.

The Global Matrix on Physical activity (PA) for children and adolescents is an initiative launched under the leadership of the Active Healthy Kids Global Alliance (AHKGA; [www.activehealthykids.org](http://www.activehealthykids.org)) to achieve a comprehensive understanding of the global variation in child and adolescent PA related indicators and key sources of influence, based on the Canadian Report Card model.<sup>1</sup> Report Cards on PA and related indicators have been developed for Portuguese young population in 2016<sup>2</sup> and 2018<sup>3</sup> as part of the global efforts led by the

\* Corresponding author. Research Centre in Physical Activity, Health and Leisure, Faculty of Sport, University of Porto, Portugal.

E-mail address: [anpizarro@fade.up.pt](mailto:anpizarro@fade.up.pt) (A. Pizarro).

Active Healthy Kids Global Alliance(AHKGA), known as Global Matrix.<sup>3,4</sup> Briefly, Global Matrix is a biannual initiative where multi countries conduct evaluation on the PA-related behaviors of children and adolescents and related indicators to develop a Report Card based on harmonized benchmarks and grading scheme allowing monitoring and comparability between countries. Therefore, following the 2016 and 2018 Portuguese Report Card on Physical Activity for Children and Youth, the goal of this study is to report the 2022 updated results of Portuguese Report Card on PA for Children and Adolescents. Added importance to this monitoring is given by the covid-19 pandemic. Despite our manuscript does not include data collected during covid-19 it will be the comparison point for before covid-19 period and will allow for future research access the impact of the pandemic restrictions in children and adolescents PA levels and indicators.

## 2. Methods

The Research Center in Physical Activity, Health and Leisure at the Faculty of Sport, University of Porto leads and coordinates the Portuguese Report Card project. Similar to the previous Portuguese Report Cards, a leadership group was established to prepare the current Report Card. This group of experts in the field of sport and physical activity (PA) represent the main Portuguese Universities and research centers in Sport Sciences. The 2022 Portuguese Report Card corresponds to the third report of its kind for the Portuguese population of children and adolescents and includes the evaluation of 10 core indicators and one additional indicator: (1) Overall PA, (2) Organized Sport and PA, (3) Active Play, (4) Active Transportation, (5) Sedentary behaviors, (6) Physical Fitness, (7) Family and Peers, (8) School, (9) Community and the Environment, (10) Government and environment. Grades were assigned to each indicator according with the process and methodology outlined by the Active Healthy Kids Canada Report Card model. Details outlining the methodology have been described previously.<sup>4</sup>

The data search was focused on published national evidence/data sources (academia, NGO, governmental) from end 2018 onwards. Data obtained during the Covid-19 pandemic and policy documents focused on responses to Covid-19 were not considered.

## 3. Results

The expert panel, following national consultation, awarded the following grades, which are presented in Table 1. The grade for each indicator is based on the percentage of children and adolescents meeting a defined benchmark derived from the expert consultation and audit analysis: A+ is 94%–100%; A is 87%–93%; A- is 80%–86%; B+ is 74%–79%; B is 67%–73%; B- is 60%–66%; C+ is 54%–59%; C is 47%–53%; C- is 40%–46%; D+ is 34%–39%; D is 27%–33%; D- is 20%–26%; F is <20%; INC is Incomplete data. Thus, the data collected allowed the expert group to allocate the following grades to the Portuguese children and adolescents: Overall PA (D<sup>-</sup>), Organized Sport Participation (C<sup>-</sup>), Active Play (D<sup>+</sup>), Active Transportation (D<sup>-</sup>), Sedentary behaviors (C<sup>+</sup>), Physical Fitness (C), Family and Peers (B), School (A), Community and Environment (B), and Government (B).

Table 2 shows the grade trends for each indicator since 2016 when Portugal adhered to report cards. Globally, most grades of the previous Portuguese Report Card were apparently stable although overall PA levels showed a slight decrease. A decrease in the grade was seen in Organized Sports Participation and in Active Transportation. On the other hand, there was a 2 point improvement in sedentary behaviors and also Family and Peers improved as seen by grade change.

To contrast our country results with neighbor countries (Spain

and France) and give an overview within the European, and very high human development index (HDI) countries context, Table 3 was created. It shows that Portuguese overall PA levels, Organized Sports Participation and Family and Peers grades are in line with the comparators with exception of Spain. Active Play was graded D in Portugal and all other contexts had better results. Portugal stands out for Sedentary Behaviours, Family and Peers and School scoring better grades than the mean of all countries, Europe, very high HDI and also Spain and France. Unfortunately, Spain full report isn't yet available so comparison and lessons to learn from them could not be made.

## 4. Discussion

In this manuscript we aimed to report the most recent and available information from Portugal core indicators included in the Global Matrix 4.0. Main results show that despite small changes overall the indicators keep a stable pattern. This could reflect not only a short period of time elapsed but also a lack of publications due to covid pandemic. Nevertheless, a small decrease in an already low grade in overall PA and a slight decrease in sports participation and active transportation was found. This is of concern because covid-19 data was not included and so its expected that due to pandemic the PA levels become even more reduced. Some indicators emerged with improvements as Sedentary behaviors and particularly Family and Peers.

### 4.1. Overall Physical Activity: D<sup>-</sup>

Overall Physical Activity Level was assigned a grade of D<sup>-</sup>. The grade was based on mixed data combining objective and self-reported data. Objectively measured data on PA shows that 28.6% of young children (4–6 year-old; with mean age of 5 years-old) meet the physical activity recommendation considering the WHO 24-Hour Movement Guidelines for Children and Youth.<sup>5</sup> Data from the HBSC showed 30.2% of adolescents (13–18yr-old) complied with the WHO PA guidelines of 60 min per day of moderate-to-vigorous PA.<sup>6</sup> Other reports showed values ranging from 15% to 30%.<sup>7–9</sup> Information obtained from questionnaires, such as the HSBS study<sup>6</sup> suggested higher levels of PA compared with information derived from studies using objective assessment of PA,<sup>5</sup> although that was in young children. According to this report, only 30% of Portuguese youngsters were sufficiently active.

Thus, available data showed that health-related PA guidelines were not being reached by a substantial number of youths, following the data observed previously in similar reports.<sup>2,4</sup>

### 4.2. Organized sport participation: C<sup>-</sup>

Organized Sport Participation was assigned a grade of C<sup>-</sup> and the grade was based on self-reported as well as governmental data sources. About 15–20% of children and adolescents living in Portugal are currently enrolled in a sport club/sport federation (<http://www.idesporto.pt/conteudo.aspx?id=103> and <https://www.pordata.pt>). Approximately 20% of children and adolescents, enrolled in formal education, participate in school sports clubs (Portuguese Ministry of Education – unpublished data). In a school-based study with a sample of 834-paired parent and child (6–10 years old), results showed that most of the children (67.7%) are engaged in an extracurricular sport.<sup>15</sup> Recent data involving Portuguese children pointed out that 48% of children participated in formal PA<sup>13</sup>, or at least one sport activity.<sup>11</sup>

**Table 1**  
Grades and rationales for Portuguese's 2022 report card.

Indicator	Grade	Rationale
Overall Physical Activity Levels	D-	Objectively measured data on PA shows that 28.6% of young children (4–6-year-old; with mean age of 5years- old) meet the physical activity recommendation considering the WHO 24-Hour Movement Guidelines for Children and Youth. <sup>5</sup> Data from the HBSC showed 30.2% of adolescents (13-18yr-old) complied with the WHO PA guidelines of 60 min per day of moderate-to-vigorous PA. <sup>6</sup> Other reports showed values ranging from 15% to 30%. <sup>7–9*</sup> The grade is based on mixed data combining objective and self-reported data.
Organized Sport Participation	C-	About 15–20% of children and adolescents living in Portugal are currently enrolled in a sport club/sport federation, ( <a href="http://www.idesporto.pt/conteudo.aspx?id=103">http://www.idesporto.pt/conteudo.aspx?id=103</a> and <a href="https://www.pordata.pt">https://www.pordata.pt</a> ). Approximately 20% of children and adolescents, enrolled in formal education, participate in school sports clubs (Portuguese Ministry of Education – unpublished data). In a school-based study with a sample of 834 paired parent and child (6–10 years old), results showed that most of the children are engaged in an extracurricular sport (67.7%) (6) and recent data involving Portuguese children pointed –out that 48% of children participated in formal PA, <sup>10</sup> or at least one sport activity. <sup>11*</sup> The grade is based on self-reported as well as governmental data sources.
Active Play	D+	The proportion of 3- to 6-year-olds meeting at least 2 h of active play was 31%, while 35% in age group 7-12 years-old were engaged in at least 1 h of active play. <sup>12</sup> Moreover, data from COSI study reported that 87% of Portuguese children engaged in at least 1 h of playing outdoors. <sup>11</sup>
Active Transportation	D-	Walking was the main pattern of active transportation to school for 6-11 years-old, with differences according to urban (11.5%) or rural (29.5%) location. <sup>13</sup> However, an international study showed that only 17% of Portuguese youth reported to use active commuting. <sup>11</sup>
Sedentary Behaviours	C+	Results from the latest HBSC also shows that the percentage of Portuguese youth, aged 11–15 years, who complied with less than 2 h of recreational screen time ranges between 35% for TV and 68% for video gaming, <sup>6</sup> with an overall percentage of 52% in the use of recreational screen. <sup>8</sup> In addition, a study showed that 78.3% of the preschool children, and 78% of the school age children spent <2 h/day in TV viewing <sup>12</sup> that is in agreement with COSI study in which 77% of children spent less than 2 h in screen time. <sup>11</sup> Moreover, a study about obesity inequalities showed that only 44% of children aged 5–6 years accomplished the maximum daily screen-time recommended for age. <sup>14</sup>
Family and Peers	B	Available data for Portuguese youth suggests parental influence on offspring PA levels, showing that about 68% of parents reported to facilitate their children PA. <sup>15*</sup> The grade is based on self-reported data.
School	A	Portugal has national curricula and Physical Education (PE) classes are mandatory for all students, from pre-school until the 12th grade. Time allocated to PE classes ranges from 90 to 150/week over 2 or 3 sessions/week. A graduated PE teacher teaches PE. It is estimated at least 70%of schools offer school clubs under the supervision of a PE teacher including competitions within and between school and it is of generalized school policy to allow students to be active during their recess time. <sup>16*</sup> The grade is based on data from governmental data.
Community and Environment	B	Eurobarometer indicates that 67% of Portuguese tended to agree that their living areas offer many opportunities to be physically active. <sup>17</sup> Globally the investment in infrastructures and sports equipment and sport activities was about 65% of the municipalities' sports allocated budget. <sup>18</sup> The school sports plan (2021–2025) expects the inclusion of school facilities and/or activities to the community. <sup>16*</sup> The grade is based on self-reported as well as governmental data sources.
Government	B	The Portuguese Institute of Sport and Youth kept the National Sports for All Program. Since 2016, the Portuguese government set up The National Physical Activity Program (PNPAF) under the Directorate-general of Health (Ministry of Health), the PNPAF promotes PA within the national health system as well as within the wider community; PNPAF is also monitor PA levels and disseminates good practices of PA promotion. In 2016, the Portuguese government also launched an inter-ministerial commission for the promotion of PA with representatives from different sectors. The commission launched the Portuguese Action Plan for Physical Activity and recently presented what was accomplished regarding the key actions implemented between September 2019 and December 20, 20. <sup>19</sup>
Fitness	C	10- to 15-year-olds in Portugal are at the 40th to 60th percentile, on average, for cardiorespiratory fitness (shuttle run in 20-m laps) based on age- and sex-specific international normative data. <sup>20–22</sup> The values are lower in prepubertal girls (8.5 years old), which fall between the percentiles 10 and 20 for their age in the 10 × 5 m agility shuttle run. <sup>23</sup> Portuguese adolescents ranged between 20th, 14 to 50th <sup>21</sup> percentile for handgrip, while for standing broad jump boys are between the 40th and 50th percentiles and girls were placed between the 30th and 40th percentile. <sup>20–22</sup>

**Table 2**  
Grade Evolution in Portugal report card.

Indicator	Matrix 4.0 (2020)	Matrix 3.0 (2018)	Matrix 2.0 (2016)
Overall Physical Activity Levels	D-	D	D
Organized Sport Participation	C-	B-	B
Active Play	D+	INC	D
Active Transportation	D-	C-	C
Sedentary Behaviours	C+	C-	D
Family and Peers	B	C	C
School	A	A	B
Community and Environment	B	B	D
Government	B	B	C
Fitness	C	C	–

4.3. Active play: D<sup>+</sup>

Active Play was assigned a grade of D<sup>+</sup>. Although there are few available data related to active play and leisure activities among Portuguese school-aged children, the best available sources showed that the proportion of 3- to 6-year-olds meeting at least 2 h of active play was 31%, while 35% in age group 7-12 years-old were engaged in at least 1 h of active play.<sup>12</sup> Moreover, data from COSI study reported that 87% of Portuguese children engaged in at least 1 h of playing outdoors.<sup>11</sup> Despite the steadily increase of organized sport participation during the last few years the evidence showed

that active play during leisure as well as non-organized sport activities seems to be reducing due to increasing access to technology and other activities.

4.4. Active transport: D<sup>-</sup>

A grade of D<sup>-</sup> was assigned to Active Transport. An international study showed that only 17% of Portuguese youth reported to use active commuting to and from school.<sup>11</sup> Walking was the main pattern of active transportation to school for 6-11 years-old, with differences according to urban (11.5%) or rural (29.5%) location.<sup>13</sup>

**Table 3**  
Comparisons between Portugal grades and nearby countries, Europe, very high HDI countries and all countries.

Indicator	All countries	Very high HDI	Europe	Portugal	Spain	France
Overall Physical Activity Levels	D	D+	D+	D-	B-	D-
Organized Sport Participation	C-	C	C	C-	B+	C
Active Play	C-	C-	C	D+	B-	C
Active Transportation	C-	C-	C	D-	B-	D+
Sedentary Behaviours	D+	D	D+	C+	D	D-
Family and Peers	C-	C	C	C	C-	C
School	C-	C-	C+	B	B-	B
Community and Environment	C+	B-	B	A	C-	B
Government	C+	B-	B-	B	B	B
Fitness	C	C+	C	B	C	B

The Portuguese government approved the National strategy for cyclable active mobility 2020–2030<sup>25</sup> that allows local initiatives (essentially from municipalities and schools) to implement programs to enhance cycling as a main form of transportation to schools (<https://www.fpciclismo.pt/pagina/o-ciclismo-vai-a-escola-2>).

4.5. Sedentary behaviors: C<sup>+</sup>

A grade of C<sup>+</sup> was assigned. Popularization of mobile phones and new forms of electronic-based social interactions are contributors to new juvenile cultures, which is a world-wide problem to be tackled. Results from the latest HBSC also shows that the percentage of Portuguese youth, aged 11–15 years, who complied with less than 2 h of recreational screen time ranges between 35% for TV and 68% for video gaming,<sup>6</sup> with an overall percentage of 52% in the use of recreational screen.<sup>8</sup> In addition, a study showed that 78.3% of the preschool children, and 78% of the school age children spent <2 h/day in TV viewing<sup>12</sup> that is in agreement with COSI study in which 77% of children spent less than 2 h in screen time.<sup>11</sup> Moreover, a study about obesity inequalities showed that only 44% of children aged 5–6 years accomplished the maximum daily screen-time recommended for age.<sup>14</sup>

4.6. Physical Fitness: C

A C grade was assigned to Physical Fitness. According to the Matrix 4.0 protocol the benchmark was based on the study of Tomkinson et al.<sup>26</sup> Our data showed that 10- to 15-year-olds in Portugal are at the 40th to 60th percentile, on average, for cardio-respiratory fitness (shuttle run in 20-m laps) based on age- and sex-specific international normative data.<sup>20–22</sup> The values are lower in prepubertal girls (8.5 years old), which fall between the percentiles 10 and 20 for their age in the 10 × 5 m agility shuttle run.<sup>21,23</sup> Portuguese adolescents ranged between 20th, 14 to 50th percentile for hand-grip, while for standing broad jump boys are between the 40th and 50th percentiles and girls were placed between the 30th and 40th percentile.<sup>20–22</sup>

4.7. Family and peers: B

A B grade was assigned to family and peers domain. The importance of family and peer support for the promotion of PA is universally recognized. However, this indicator is very difficult to examine based on a lack of empirical data adhering to the grading framework. Indeed, familial determinants and correlates of sport and physical activity were not systematically studied in national representative surveys. At the best of our knowledge the available data reported (self-reported) showed that for Portuguese population, parental influence on offspring PA levels was about 68% of parents reporting to facilitate their children PA.<sup>15</sup>

4.8. School: A

A grade of A was assigned for the school indicator. The grade was based on governmental data. Portugal has national curricula and Physical Education (PE) classes are mandatory for all students, from pre-school until the 12th grade. Time allocated to PE classes ranges from 90 to 150 min per week over 2 or 3 sessions. Excluding in pre-school where the main educator is also responsible for PE activities, PE is taught by a graduated PE teacher. It is estimated that at least 70% of schools offer school clubs under the supervision of a PE teacher including competitions within and between schools and it is of generalized school policy to allow students to be active during their recess time.<sup>16</sup>

4.9. Community and environment: B

A grade of B was assigned for the community and environment. The grade was based on self-reported as well as governmental data sources. Indeed, Eurobarometer indicates that 67% of Portuguese tended to agree that their living areas offer many opportunities to be physically active.<sup>17</sup> Globally the investment in infrastructures and sports equipment and sport activities was about 65% of the municipalities' sports allocated budget.<sup>18</sup> The school sports plan (2021–2025) expects the inclusion of school facilities and/or activities to the community.<sup>16</sup>

4.10. Government: B

A grade of B was assigned to this indicator. There are several government laws and regulations intended to promote participation in PA and sport. The Portuguese Institute of Sport and Youth kept the National Sports for All Program that seeks to fund initiatives from different sector stakeholders that support and promote PA. Since 2016, the Portuguese government set up The National Physical Activity Program (PNPAF) under the Directorate-general of Health (Ministry of Health), the PNPAF promotes PA within the national health system as well as within the wider community; This included a pilot project in selected, nationwide, health centers were a PA consultation for people with diabetes and depression was held by exercise specialists, an increase in the dissemination on the media of the importance of PA for general health. PNPAF is also monitor PA levels and disseminates good practices of PA promotion. In 2016, the Portuguese government also launched an inter-ministerial commission for the promotion of PA with representatives from different sectors. The commission launched the Portuguese Action Plan for Physical Activity and recently presented what was accomplished regarding the key actions implemented between September 2019 and December 20, 20<sup>19</sup> including a mass media marketing campaign to disseminate that every move count and to promote an active lifestyle.

Data available for this report was scarce in some indicators and



therefore results should be interpreted with caution. Although in line with European countries, low grade in overall PA level sets the urgency for measures to improve children and adolescents PA levels as they remain low for quite some time and showed a decreasing trend in Portugal. This is concern as children aren't exposed to physical and mental health benefits of physical activity such as improved bone health, cardiorespiratory and muscular fitness, or cognition.<sup>27</sup>

Successful interventions to change behaviors, particularly linked to PA, should consider the influence and dynamic interplay of multilevel factors suggested by the ecological model.<sup>28</sup> Therefore interventions combining multiple factors in different levels including urban design, transport infrastructure, school and community are necessary to increase PA levels. Acting in each of the PA indicators is essential to see overall changes in PA so, learning about other countries indicators could give a perspective on good practices to replicate after addressing specific cultural and contextual needs.

Nevertheless, some of the investments and policies seen in Government and Community and environment which were both graded with a B take time to be reflected in overall PA levels, particularly as they are being implemented at a slow rate and before massive dissemination effectiveness and impact studies need to be done; still, this are promising indicators and impact in PA levels are expected as the strategies are being widespread. Active transportation decreased its grade compared to 2018 despite this, a nationwide project aiming to teach kids skills for riding a bike, and promoting cycling to school is being implemented and changes are anticipated, also environmental changes are also being conducted in some regions aiming to increase this behavior, as other measures implement in successful countries such as the school within walking distance<sup>4</sup> from home (2 km is the usual in Portugal) does not seem to be enough. School indicator, graded with A due to their mandatory PE classes across all the 12 school years, might not be of sufficient impact as reflected in overall PA levels and also fitness perhaps because the intensity is insufficient<sup>29</sup> or time allocated per week is not enough. So, more intensity control for the PE lessons could be helpful or even schedule PE classes everyday as seen in Hungary.<sup>4</sup> Active play was measured for the first time and due to its sporadic characteristics, it can happen everywhere anytime making it a challenge to assess<sup>4</sup> and more research is needed to inform us more on this indicator. For example, Spain grades in active play are attributed to the good climate and low access to sports facilities due to low income of some parts of the country (Murcia) making active play an easiest choice.

Organized sports activities are in line with results from other countries with exception from Spain, maybe due to dropout that commonly happens at this age, lack of infrastructure, or sports culture but research on the reasons is needed. Besides sports associations also schools could play an important role here, as school leagues could be promoted and implement some kind of reward for students who get involved in these activities. Some countries have mandatory sports participation which obviously reflects on organized sports levels. Another action that seems relevant is a good surveillance and follow up system for young athletes to validate these data.

## 5. Strengths and limitations

The strength of this study was that data were updated based on the best available evidence either from academic or institutional field. A major limitation of the 2022 Portuguese Report Card was the few available data/sources in some of the assessed domains to provide stronger and deeper information about the grades assigned for each indicator. Moreover, research does not always represent

nationwide data but only locations/regions instead, therefore it is imperative that investigation widespread to be more representative of all of the country. Thus, efforts still need to be made to seek information that might provide an understanding of PA of children and adolescents in Portugal.

## 6. Conclusion

Despite the grade approach has been slightly modified, in line with previous Portuguese Report Cards, available evidence continues to indicate consistently that a large proportion of Portuguese children and adolescents are not sufficiently active nor fit enough, setting urgency for effective strategies. In Portugal, particular attention should be given to Active play, Active transport and Organized Sports Participation has their grades have decreased since last report and new strategies could be tested. Some actions, in selected indicators as Governmental and policy such as the national plan for physical activity, mass media campaigns and PA appointments in health centers didn't seem to had time to thrive but are promising. Despite the strong support of schools, that have formal and mandatory curricula in PE across all school grades, no correspondent change is seen in fitness or PA, so more research is needed to find the reasons why and try new approaches learned from other countries.

Based on evidence from other countries report cards, it seems global efforts aiming different indicators at the same time would be a good strategy to increase PA levels of children and adolescents. Being part of the global health alliance allows us to learn from best practices and discuss strategies to increase overall PA levels and consequently global health despite implementing a surveillance system that can give us insights of the impact of the national strategies.

## Author contributions

AP, JMS, RS contributed with analysis and data interpretation, JR, MS, MJCS, AR, helped in the acquisition of data, analysis and interpretation, LS, JM drafted the article and JM and AP revised it critically. All authors have contributed with important intellectual content, read and approved the final version of the manuscript.

## Acknowledgements

AP, JM, JOS, JR, MPS are supported by FCT- FCT/UIDB/00617/2020 and LA/P/0064/2020. Rute Santos is currently supported by FCT, within the framework of the research Centre in Child Studies, university of Minho (UIDB/00317/2020 and UIDP/00317/2020).

## References

- Colley RC, Brownrigg M, Tremblay MS. A model of knowledge translation in health: the Active Healthy Kids Canada Report Card on physical activity for children and youth. *Health Promot Pract.* May 2012;13(3):320–330. <https://doi.org/10.1177/1524839911432929>.
- Mota J, Coelho-e-Silva MJo, Raimundo AM, Sardinha LB. Results from Portugal's 2016 report card on physical activity for children and youth. *J Phys Activ Health.* 2016;13(s2):S242–S245. <https://doi.org/10.1123/jpah.2016-0293>, 01 Nov. 2016.
- Tremblay MS, Gray CE, Akinroye K, et al. Physical activity of children: a global matrix of grades comparing 15 countries. *J Phys Activ Health.* May 2014;11(Suppl 1):S113–S125. <https://doi.org/10.1123/jpah.2014-0177>.
- Aubert S, Barnes JD, Abdeta C, et al. Global matrix 3.0 physical activity report card grades for children and youth: results and analysis from 49 countries. *J Phys Activ Health.* Nov 1 2018;15(S2):S251–S273. <https://doi.org/10.1123/jpah.2018-0472>.
- Vale S, Mota J. Adherence to 24-hour movement guidelines among Portuguese preschool children: the prestyle study. *J Sports Sci.* Sep 2020;38(18):2149–2154. <https://doi.org/10.1080/02640414.2020.1775385>.
- Dos Santos CS, Picoito J, Loureiro I, Nunes C. Clustering of health-related

- behaviours and its relationship with individual and contextual factors in Portuguese adolescents: results from a cross-sectional study. *BMC Pediatr.* May 2020;20(1):247. <https://doi.org/10.1186/s12887-020-02057-1>.
7. Guthold R, Stevens GA, Riley LM, Bull FC. Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1.6 million participants. *Lancet Child Adolesc.* Jan 2020;4(1):23–35. [https://doi.org/10.1016/S2352-4642\(19\)30323-2](https://doi.org/10.1016/S2352-4642(19)30323-2).
  8. Marques A, Peralta M, Santos T, Martins J, Gaspar de Matos M. Self-rated health and health-related quality of life are related with adolescents' healthy lifestyle. *Publ Health.* May 2019;170:89–94. <https://doi.org/10.1016/j.puhe.2019.02.022>.
  9. Ghekiere A, Van Cauwenberg J, Vandendriessche A, et al. Trends in sleeping difficulties among European adolescents: are these associated with physical inactivity and excessive screen time? *Int J Publ Health.* May 2019;64(4):487–498. <https://doi.org/10.1007/s00038-018-1188-1>.
  10. Rodrigues D, Padez C, Machado-Rodrigues AM. Active parents, active children: the importance of parental organized physical activity in children's extracurricular sport participation. *J Child Health Care.* Mar 2018;22(1):159–170. <https://doi.org/10.1177/1367493517741686>.
  11. Whiting S, Buoncristiano M, Gelius P, et al. Physical activity, screen time, and sleep duration of children aged 6–9 Years in 25 countries: an analysis within the WHO European childhood obesity surveillance initiative (COSI) 2015–2017. *Obes Facts.* 2021;14(1):32–44. <https://doi.org/10.1159/000511263>.
  12. do Carmo AS, Rodrigues D, Nogueira H, et al. Influence of parental perceived environment on physical activity, TV viewing, active play and Body Mass Index among Portuguese children: a mediation analysis. *Am J Hum Biol.* Nov 2020;32(6), e23400. <https://doi.org/10.1002/ajhb.23400>.
  13. Rodrigues D, Padez C, Machado-Rodrigues AM. Environmental and socio-demographic factors associated with 6–10-year-old children's school travel in urban and non-urban settings. *J Urban Health.* Dec 2018;95(6):859–868. <https://doi.org/10.1007/s11524-018-0295-x>.
  14. Rodrigues D, Gama A, Machado-Rodrigues AM, et al. Screen media use by Portuguese children in 2009 and 2016: a repeated cross-sectional study. *Ann Hum Biol.* Jan 2021;48(1):1–7. <https://doi.org/10.1080/03014460.2021.1876921>.
  15. Rodrigues D, Padez C, Machado-Rodrigues AM. Parental perception of barriers to children's participation in sports: biological, social, and geographic correlates of Portuguese children. *J Phys Activ Health.* Aug 1 2019;16(8):595–600. <https://doi.org/10.1123/jpah.2018-0390>.
  16. *Programa Estratégico Do Desporto Escolar 2021–2025.* 2021.
  17. European Commission. *Sport and Physical Activity. Directorate-General for Education Youth Sport and Culture.* 2017. Special Eurobarometer 472.
  18. IPDJ. *Desporto em Números.* 2020.
  19. *Programa Nacional para a Promoção da Atividade Física.* Direção-Geral da Saúde; 2020.
  20. Agostinis-Sobrinho C, Garcia-Hermoso A, Ramirez-Velez R, et al. Longitudinal association between ideal cardiovascular health status and muscular fitness in adolescents: the LabMed Physical Activity Study. *Nutr Metab Cardiovas.* Sep 2018;28(9):892–899. <https://doi.org/10.1016/j.numecd.2018.05.012>.
  21. Luz C, Cordovil R, Rodrigues LP, et al. Motor competence and health-related fitness in children: a cross-cultural comparison between Portugal and the United States. *J Sport Health Sci.* Mar 2019;8(2):130–136. <https://doi.org/10.1016/j.jshs.2019.01.005>.
  22. Henriques-Neto D, Magalhaes JP, Judice P, et al. Mediating role of physical fitness and fat mass on the associations between physical activity and bone health in youth. *J Sports Sci.* Dec 16 2020;38(24):2811–2818. <https://doi.org/10.1080/02640414.2020.1801326>.
  23. Luz LGO, Coelho-E-Silva MJ, Duarte JP, et al. Multivariate relationships among morphology, fitness and motor coordination in prepubertal girls. *J Sports Sci Med.* Jun 2018;17(2):197–204.
  24. Mota J, Santos R, Coelho-e-Silva MJ, Raimundo AM, Sardinha LB. Results from Portugal's 2018 report card on physical activity for children and youth. *J Phys Activ Health.* 2018;15(s2):S398–S399. <https://doi.org/10.1123/jpah.2018-0541>, 02 Jan. 2018.
  25. *Resolução do Conselho de Ministros n.º 131/2019 de 2 de agosto de 2019.* 2019: 46–81.
  26. Tomkinson GR, Carver KD, Atkinson F, et al. European normative values for physical fitness in children and adolescents aged 9–17 years: results from 2 779 165 Eurofit performances representing 30 countries. *Br J Sports Med.* Nov 2018;52(22):1445–14563. <https://doi.org/10.1136/bjsports-2017-098253>.
  27. U.S. Department of Health and Human Services. *Physical Activity Guidelines for Americans.* 2018.
  28. Sallis J, Owen N, Fisher E. *Ecological Models of Health Behavior. Health Behavior and Health Education: Theory, Research, and Practice.* Jossey-Bass; 2008: 465–482.
  29. Costa M, Oliveira T, Mota J, et al. Objectively measured physical activity levels in physical education classes and body mass index (Niveles de actividad física medida objetivamente en las clases de educación física y el índice de masa grasa). *Retos.* 2017;31:271–274. <https://doi.org/10.47197/retos.v0i31.53502>.