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The 2022 India Report Card on physical activity for children and adolescents

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ABSTRACT

Background/Objective: With strong evidence of physical inactivity's link to chronic disease and economic burden – particularly with childhood active living behaviors tracking into adulthood – it is imperative to promote physical activity among children and adolescents in India.**Objectives:** To evaluate active living patterns among Indian children and adolescents.**Methods:** The India Report Card (IRC) team, which consists of experts in India and Canada, systematically collected and appraised evidence on 11 indicators of active living, including 5 behavioral (*Overall Physical Activity, Organized Sport Participation, Active Play, Active Transportation, Sedentary Behavior*), 2 individual-level (*Physical Fitness, Yoga*) and 4 sources of influence (*Family and Peers, School, Community and Built Environment, Government*). Peer-reviewed articles were appraised based on national representativeness, sample size, and data quality. Grey literature was appraised based on comprehensiveness, validity of the sources, and representativeness. All indicators were assessed against parameters provided by the Active Healthy Kids Global Alliance.**Results:** *Active Transportation* and *Government Strategies* were ranked highest with a B- and C+ grade, respectively. *Overall Physical Activity* and *Schools* were assigned a C grade, while *Sedentary Behavior* and *Community and Built Environment* were given D grades. *Yoga* was the lowest ranking indicator with a D-grade. *Organized Sport Participation, Active Play, Family and Peers*, and *Physical Fitness* were all graded incomplete.**Conclusions:** *Active Transportation, Government Strategies*, and *Overall Physical Activity* have improved since the 2018 IRC, a positive trend that needs to be translated to other indicators. However, *Sedentary Behavior* has consistently worsened, with grades C, C-, and D-, in 2016, 2018, and 2022, respectively. Evidence generated by the 2022 IRC suggests opportunities for improvement not only in India, but also the 56 other countries taking part in Global Matrix 4.0.© 2022 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

Physical inactivity has been linked to noncommunicable disease and economic burden globally, and poses significant challenges in rapidly growing countries including India, which is currently home

to the second largest population in the world.^{1–5} With active living behaviors in childhood tracking into adulthood,⁶ the potential disease burden has widespread impacts. Evidence shows that physical inactivity costs an estimated \$33.8 billion to healthcare systems internationally, with low- and middle-income countries (LMICs) bearing up to 75% of the disease burden.⁵ As a result, it is imperative to promote active living among children and adolescents in LMICs such as India. Answering this call, we generated the “2016 India Report Card on Physical Activity for Children and

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Youth” to not only depict patterns of active living, but also to identify investments, policies, and programs that drive the physical and social environments wherein children and youth accumulate physical activity.¹

The 2016 India Report Card concluded that most Indian children do not achieve recommended levels of physical activity and spend most of their day in sedentary pursuits.¹ The report also identified gaps in both investments and research that need to be addressed before understanding the complete picture of active living among children and youth in India. To reassess patterns of active living among Indian children and youth, two years after releasing the 2016 Report Card, the 2018 India Report Card on Physical Activity for Children and Youth was developed.²

The 2018 India Report Card addressed most of the evidence gaps identified by the 2016 Report Card; however, it reiterated the need for nationally representative active living research, as well as renewed government strategies and investments to facilitate active living among children and youth. As part of this initiative, Active Healthy Kids India,⁷ a non-profit organization was established to advocate for active living among children and youth in India.

Active Healthy Kids India continues to invest in active living initiatives in India, and the 2022 India Report Card, which evaluates active living patterns and contexts among Indian children and adolescents, is a collaboration between Active Healthy Kids India and the Active Healthy Kids Global Alliance (AHKGA).⁸ Based on the evidence-based criteria developed by AHKGA,^{9,10} and taking into account cultural components specific to India (i.e., the practice of yoga), this study assessed 11 active living indicators, including behavioral measures (overall physical activity, organized sport participation, active play, active transportation, sedentary behavior), individual-level (physical fitness, yoga), and environmental influences (family and peers, school, community and the built environment, and government strategies and investments). The ultimate goal of the 2022 India Report Card is to not only catalyze post-pandemic active living efforts for children and adolescents in India, but also to translate this knowledge across the 57 countries participating in the Global Matrix 4.0 initiative.¹¹

2. Methods

The India Report Card on Physical Activity for Children and Adolescents (IRC) is part of the Global Matrix 4.0 – an international initiative led by AHKGA whereby participating countries synthesize evidence on 10 core indicators of active living, and assign a grade based on a standardized rubric.^{11,12} The IRC is an Indo-Canadian collaboration involving five experts (JB, AK, GVK, KK, TRK) in physical activity, child health, and health policy from five universities and institutions in India and Canada.

A systematic search of peer-reviewed and grey literature was conducted for 10 indicators of active living: *Overall Physical Activity, Organized Sport Participation, Active Play, Active Transportation, Sedentary Behavior, Physical Fitness, Family and Peers, School, Community and the Built Environment, and Government Strategies and Investments*. The IRC team added an 11th indicator for *Yoga* given its cultural significance.^{13,14} The definitions and benchmarks for each indicator have been published as part of Global Matrix initiatives and are summarized in [Appendix A](#).^{11,13}

In consultation with a university librarian, relevant databases were selected, and peer-reviewed literature was identified through PubMed and Web of Science. Grey literature searches included tailored Google searches for each indicator, as well as hand-searches of Government and Ministry websites, physical activity and health-focused non-profit organizations, school board websites, and national program websites. This approach included a comprehensive search strategy for each of the 11 indicators of

active living among children and youth aged 5–17 years. All studies and reports published since the 2018 IRC (November 1, 2018 to April 1, 2022) were considered in the analysis.

Primary data were collected in February 2021 as part of a multi-center cohort study in Pune, Maharashtra. Children and youth aged 5–17 years (n = 1042) were recruited from urban and rural schools in the city center and 100 km from the city center, respectively. A total of 527 males (50.6%) and 515 females (49.4%) from urban (59.7%) and rural (40.3%) areas answered survey questions about physical activity, organized sport participation, active transportation, family and peer support, the built environment, and school policies. A specific questionnaire was also developed to capture the prevalence of yoga practice among children and youth.

Data appraisal was conducted for studies uncovered in the literature search. Two reviewers screened titles and abstracts, selected relevant articles, and reached consensus on a final shortlist after reviewing full articles. Relevant data were synthesized into a data abstraction table to tabulate evidence for each indicator. Peer-reviewed articles were appraised based on national representativeness, sample size, and data quality. Grey literature was appraised based on comprehensiveness, validity of the source, and representativeness.

All indicators were assessed against parameters provided by AHKGA,^{11,13} with the exception of yoga, for which the IRC team reviewed the proportion (%) of children and youth who practiced any form of yoga daily. The grades were assigned following AHKGA's evidence-based and standardized grading criteria, which enabled consistency of grading across all countries participating in the Global Matrix initiative.¹¹

The grading process involved applying a standardized formula in consultation with AHKGA.¹¹ Based on the total number of studies shortlisted for each indicator, each study was assigned a weight. The following formula was used to assign weights: $G = (g1*w1) + (g2*w2)/W$, where G = overall grade; W = 100% total weightage; g = individual study grade; and w = weight assigned to each study based on the proportion of each study sample within the total sample. Nationally representative peer-reviewed articles and primary data were given additional weightage of 15%.

This grading process involved the IRC team assigning grades to all indicators before submission to AHKGA for auditing. The shortlisted studies, formula, and grade rationale were audited independently by AHKGA, external to the IRC team. The grades were audited by at least 2 AHKGA auditors, and two rounds of audits were performed for the IRC grades, until a final version was approved by all auditors.¹¹

3. Results

A total of 35 articles and reports were included in the final analysis, which included 19 peer-reviewed studies, 16 grey literature sources (12 websites, 4 reports), and primary data from a study conducted in Pune, India. [Table 1](#) presents a summary table of the 2022 IRC grades. [Fig. 1](#) shows the 2022 IRC Cover Page.

3.1. Overall physical activity

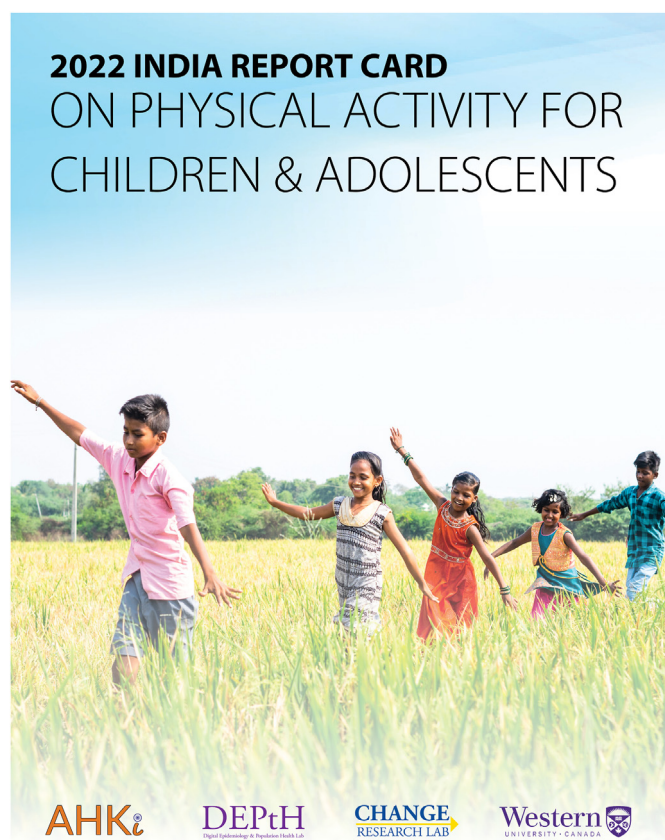
Overall Physical Activity refers to the proportion of children and adolescents meeting PA guidelines.¹³ Evidence from 27 states in India (N = 3808 across urban and rural jurisdictions) was appraised to grade *Overall Physical Activity*,^{15–18} as well as primary data from urban and rural children and adolescents aged 5–17 years (n = 1042).

A study conducted among 15–17 year old youth (n = 1531) in 27 states found that 25.2% of adolescents did not meet moderate-to-vigorous physical activity (MVPA) guidelines.¹⁶ The survey-based

Table 1

2022 Grades summary of the India report card for physical activity for children and adolescents.

Indicator	Grade
Overall Physical Activity	C*
Organized Sport Participation	INC
Active Play	INC
Active Transportation	B-
Sedentary Behavior	D-
Physical Fitness	INC
Family and Peers	INC
School	C
Community and the Built Environment	D
Government Strategies and Investments	C+
Yoga	D-*

**Fig. 1.** 2022 India report card on physical activity for children and adolescents cover page.

data found that a higher proportion of urban residents were insufficiently physically active (38%), as well as girls (29.3%) in the sample. A total of 64.3% reported doing physical activity in schools and spent an average of 16.1 min per day. While 72% of the sample accumulated at least 60 minutes of physical activity, this included light physical activity such as housework (i.e., not MVPA). A study in Chennai, Tamil Nadu collected objective physical activity data using accelerometers among adolescents ($n = 324$).¹⁵ Adolescents accumulated an average of 25.8 min of MVPA daily. Another study among 10–15-year-old youth ($n = 772$) in Mumbai, Maharashtra found that the majority (62%) reported not meeting MVPA guidelines, and only 38% of youth met guidelines. Approximately 64% of girls and 60.2% of boys did not meet MVPA guidelines.¹⁷ In addition, a study conducted with 11–13-year-olds ($n = 139$) in Tamil Nadu

found that only 31.7% of children met the MVPA guidelines of 60 min/day.¹⁸

The primary data, similar to the peer-reviewed literature, found that almost half of children and adolescents engaged in MVPA 6 or more times per week for at least 60 min each session. A greater proportion of urban participants reported meeting MVPA guidelines (49.6%) compared to rural participants (45.8%). Significant gender differences were found, with 35.6% of females meeting MVPA guidelines compared to 45.8% of males.

Following a weighted assessment of recent evidence, approximately half of children and adolescents met the minimum recommendation of 60 min of MVPA per day, resulting in a C* grade. The asterisk denotes that there are significant gender differences across studies, with boys more likely to meet MVPA guidelines than girls, thus this weighted average does not reflect differences based on gender.

3.2. Active transportation

Active Transportation refers to the proportion of children and adolescents who walk or bike to different destinations (i.e., home, school, park, friend's house).¹³ Evidence from peer-reviewed studies^{19–21} and unpublished primary data ($N = 2696$ across all samples) was reviewed from urban and rural children and youth.

A study conducted in Chennai, Tamil Nadu among youth aged 12–17 years ($n = 324$) found that the vast majority (73.5%) of adolescents did not walk to/from school, and 28.1% reported walking 5–6 days per week on average. The proportion of adolescents who cycled was similar, with 78.4% of adolescents reporting no cycling, and 20.4% cycling 5–6 days per week on average.¹⁹ Approximately 52% of adolescents used an active mode of travel to/from school at least 1 trip per week, with no gender differences reported.¹⁹ Another study conducted across 9 high schools using randomized stratified sampling ($n = 1096$) in Kanpur, Uttar Pradesh found a gender effect of travel mode choice.²⁰ On average, 35% of adolescents aged 5–17 years engaged in active transport, with 24.5% of males cycling and 15.4% walking to school (total 39.9% engaging in active transport). Approximately 18% of females reported walking to school, and 10% cycled to school (total 28% engaging in active transport). Lastly, a cross-sectional study conducted in Punjab among adolescents aged 11–17 years ($n = 1050$) from urban and rural government schools found that 90% of participants engaged in an active mode of travel.²¹

In addition to secondary data appraisal, primary data collected in urban and rural Pune ($n = 226$) found that 45.7% of males and 54.3% of females cycled to school, and 39.7% of males and 60.3% of females walked to school. Overall, across studies, approximately 60% of children and adolescents reported walking or cycling to school on a regular basis, thus active transportation received a B-grade. Greater weight was given to studies conducted in multiple jurisdictions, as they were more representative of active transportation across India. The grey literature search uncovered several reports focused on active transportation initiatives; however, these reports largely focused on the built environment and did not present evidence of program implementation or impacts on children or adolescents.^{22,23}

3.3. Sedentary behavior

Sedentary Behavior refers to the proportion of children and adolescents who meet the guideline of less than 2 hours of recreational screen time per day.^{13,24} Many physical activity-focused studies uncovered in the literature search measured sedentary time; however, these data could not be used because they were inconsistent with the Canadian Sedentary Behavior Guidelines

used by the Global Matrix.²⁴ Evidence from several large urban centers in India (N = 3203 across studies) were assessed to identify sedentary behavior patterns in India.^{17,18,21,25}

A study conducted in urban and rural schools in Thanjavur, Tamil Nadu (n = 200) among grade 8 and 9 students found that the average screen time was 6.59+/-1.24 hours among urban boys, 3.28+/-0.17 hours for rural boys, 4.28+/-0.49 hours for urban girls, and 4.07+/-0.44 hours among rural girls.²⁵ In all categories, students reported exceeding the daily recommendation of 2 hours of screen time daily. Another study conducted among adolescents aged 11–17 years (n = 1050) from urban and rural government schools in the three regions of Punjab found that average weekly screen time was 9.8 hours for urban students and 9.5 hours for rural students.²¹ A study conducted with adolescents aged 10–15 years in Mumbai, Maharashtra (n = 772) found that 85% reported screen time over 120 minutes daily.¹⁷ Girls reported higher screen time (average 218 minutes per day compared to 165 minutes per day for boys).¹⁷ In another cross-sectional observational study conducted among children aged 10–13 years (n = 139) in Tamil Nadu, the average daily screen time was over 2 hours (52.5%), with 28.8% of the sample reporting less than 60 minutes of daily screen time.¹⁸

A review of primary data collected in Pune (n = 1042) found that 25.6% of children and youth met the screen time guidelines of less than 2 hours daily. There was not a statistically significant difference between urban and rural participants; however, when comparing male vs. female screen time behavior, 23.3% of males met screen time guidelines compared to 28% of females. Overall, there was great variation in how studies depicted sedentary behavior accumulation. When assessed in accordance with the screen time guidelines,¹³ a weighted average demonstrated that only one-quarter of Indian children and adolescents met guidelines, thus *Sedentary Behavior* received a D- grade.

3.4. School

School is a complex indicator which captures infrastructure, as well as school policies and programs.¹³ Evidence from three peer-reviewed studies^{16,26,27} and primary data collected in urban and rural jurisdictions provided a picture of student's access to physical activity infrastructure and access in different school boards.

One study conducted with teachers from 19 schools in New Delhi captured information about school policies, and also surveyed parents of children and youth aged 6–7 years (n = 574) and 15–16 years (n = 755) to understand school practices.²⁶ The study found that 80% of primary and 90% of secondary private schools had PE in the curriculum. The majority of primary (78%) and secondary (100%) government schools also had PE in the curriculum. This included two PE periods per week totaling 50 minutes in government schools and 40 minutes in private schools. Yoga was included in 70% of primary and 60% of secondary private schools, as well as 67% of primary and 78% of secondary government schools surveyed. Overall, Bassi et al. (2019) found that PE was available at least once per week in almost 80% of schools, but there was no evidence of daily physical activity or daily access to physical activity opportunities at school.²⁶

In a study conducted across 61 schools (17 government and 44 private) in Bengaluru, playgrounds were available in 16% of private and 65% of government schools.²⁷ However, there was no evidence of regular access for students to playgrounds. In addition, a national, cross-sectional survey across urban and rural areas in India which included 1402 households and 1531 adolescents,¹⁶ found that approximately two-thirds of students reported having health education in school (including PE). A total of 64.3% of adolescents reported doing physical activity in their schools for an average of 16.1 minutes per day.¹⁶ Similarly, primary data collected in Pune

found that 44% of students reported having access to activity areas between school hours, 63% reported having access to outdoor activity areas between classes, and only 9% reported having access to the gym areas before/after school.

Overall, there is evidence that schools across India mandate physical education classes, with some schools providing physical education infrastructure and facilities access for students during the day. However, most schools do not promote accumulation of the recommended 60 minutes of MVPA daily, and limited access to physical education equipment and areas outside of school hours indicated that current school policies may be restricting opportunities for physical activity accumulation. Thus, *School* received a C grade.

3.5. Community and the built environment

Community and the Built Environment refers to the proportion of children, adolescents, and/or parents/guardians who perceive their community as conducive to physical activity. This indicator also includes communities reporting physical activity policies and infrastructure (e.g., sidewalks, trails, bike lanes), as well as parks, playgrounds, and overall safety and aesthetic of a neighborhood to facilitate active living.¹³ A total of four peer-reviewed studies and one primary dataset were reviewed, which included 1542 respondents across India.^{19,28–30}

A cross-sectional study conducted in Kharagpur, West Bengal surveyed children 9–13 years (n = 40) regarding perceptions of neighborhoods, mobility patterns, and daily physical activity.²⁸ Das et al. (2021) found that most parks were located at least a 20-minute walk from participants' homes; however, low park accessibility, availability of benches, and safety were noted as big issues affecting children's mobility.²⁸ Another cross-sectional study conducted with parents of children aged 7–12 years (n = 15 families) in New Delhi found that 82% of parents restricted children's independent mobility, with only 46% of parents reporting that they trusted neighbors to keep an eye on children in their absence.²⁹ The majority of parents (68%) felt that the built environment (i.e., footpaths of sufficient width, traffic) was conducive to children's physical activity. There were low perceptions of safety, in general, and parents reported that their children's gender (i.e., having a female child) limited independent mobility.²⁹

A study conducted in Lucknow, Uttar Pradesh surveyed 47 professionals including architects, planners, psychologists, and pediatricians using the Delphi method, as well as children and youth aged 6–14 years (n = 59) to understand perceptions of child-friendliness of neighborhood built environments.³⁰ The study found that Lucknow did not meet quantitative norms and standards as laid out by the national standards for open spaces and parks. The overall "child-friendliness" was rated as 'weak'.³⁰ Similarly, a study conducted in Chennai among youth aged 12–17 years (n = 324) found that 50% of youth said there were no pavements for walking, 28.7% reported open drains on their commuting path from school-home, 47.5% noted dangerous crossings, 47% reported that it was too far to walk or cycle to school, 55.6% reported too much traffic, and 45% reported the presence of stray dogs as dangerous for active transportation.¹⁹

Evidence from primary data collected in Pune found that 53% of children and youth (n = 1042) described air pollution as a problem, with 35% of respondents reporting that pollution prevented them from outdoor physical activity. Air pollution was reported as a bigger problem in urban settings across studies. Overall, recent evidence poorly rated urban infrastructure for walking and biking, access to physical activity spaces, safety from crime and traffic, pollution, and aesthetics, resulting in a D grade for *Community and the Built Environment*.

3.6. Government strategies and investments

Government Strategies and Investments refers to the demonstrated leadership, investments, and evidence of implementation of physical activity strategies targeting children and adolescents (i.e., policy agenda, formulation, implementation, evaluation and decisions about the future) in India.¹³ A systematic search uncovered several publications,^{31–34} including a report on the Khelo India initiative which was recently introduced to revive sports culture in India at the grassroots level.³¹ An investment of 1756 crores is reported between 2018 and 2020 to build sports infrastructure in India. A report on National Youth Policy in India³⁴ summarized investments made by national and state governments to improve sports infrastructure through programs like Khelo India and the National Playing Fields Association of India. However, there was no evidence of a concerted national strategy or vision to address the physical inactivity epidemic through education of parents, teachers, or development of intersectoral policy interventions (i.e., urban/transportation planning). In addition, the majority of government strategies in India were predominantly focused on competitive sport and the development of national and international athletes. Thus, *Government Strategies and Investments* received a C+ grade.

3.7. Yoga

Yoga refers to the proportion of children and adolescents practicing any form of yoga (e.g., hatha, ashtanga) at home or school. Given its cultural significance and history, yoga is a physical activity which public, private, and governmental organizations have emphasized in school and community programming across India. Primary data were collected using cross-sectional surveys in 2021 among children and youth ($n = 1042$) in Pune. When asked about yoga practice, only 22.3% of the sample reported practicing yoga daily. The proportion was higher among urban (28.5%) vs rural (13.1%) participants, and also higher among females (24.1%) compared to males (20.5%). Based on primary data from urban and rural jurisdictions where approximately 20% of children and adolescents reported practicing yoga, as well as the reported commitment to yoga from national and state-level organizations across India,^{35–39} the Yoga indicator received a D-* grade. The asterisk indicates that this grade was based on limited data.

3.8. Incomplete indicators

There was insufficient evidence from peer-reviewed and grey literature, as well as primary data, to assign a grade to *Active Play*, *Organized Sport Participation*, *Family and Peers*, and *Physical Fitness*.

4. Discussion

The 2022 IRC evaluates active living behaviors, and the contexts that influence those behaviors by continuing active living advocacy that began in 2016 as part of Global Matrix 2.0.^{1,9} In particular, the 2022 IRC distills peer-reviewed and grey literature, as well as primary data collected after the generation of the 2018 IRC.^{2,10} The overall findings show both positive signs as well as continuing concerns. For instance, the 2022 IRC shows that *Active Transportation*, *Government Strategies*, and *Overall Physical Activity* have improved since the previous evaluation in 2018. However, *Sedentary Behavior* has consistently worsened, with the 2022 IRC reporting a D- grade in comparison with grades C and C- grades in the years 2016, 2018, respectively. Another continuing concern is the lack of active living research and evidence, with the following indicators being graded incomplete in 2022: *Active Play*, *Family and Peers*, *Organized Sport Participation*, and *Physical Fitness*.

The need for active living research in India was part of key recommendations in both the 2016 and 2018 India Report Cards.^{1,2} In 2016, the first iteration of the IRC, six indicators were graded as incomplete, which included both *Active Play* and *Organized Sport Participation*.¹ To address this gap, Active Healthy Kids India⁷ established new partnerships, and the primary data obtained through these partnerships resulted in almost all indicators being graded, except *Organized Sport Participation* and *Yoga* – the new culturally significant indicator.² Continued partnerships allowed for primary data collection again in 2022, which enabled the assessment of *Yoga*. Although *Yoga* received a D-* grade, it is important to obtain more data to corroborate this evidence. The pervasive challenge of lack evidence for active living among Indian children and youth is apparent from the incomplete grades for several indicators in 2022. In particular, *Organized Sport Participation* has never been given a grade thus far, which also suggests the lack of equitable physical activity programming for children and adolescents across India.

Overall Physical Activity was given a C grade, which is an improvement over the evaluations in 2016 (C-) and 2018 (D).^{1,2} Paradoxically, the *Sedentary Behavior* indicator received a D-grade, a gradual downgrade from 2016 (C) and 2018 (C-). This phenomenon reiterates evidence that children and adolescents can be highly active and highly sedentary within the same day.^{40,41} An increasingly relevant factor in the consistent rise of sedentary behavior can be attributed to screen time behaviors,^{42–44} which further increased during the pandemic due to remote digital learning.^{43–45} This scenario is further facilitated by the market penetration of smartphones among Indian youth,^{46,47} an indication of future public health problems beyond physical health due to the association of some types of smartphone use with poor mental health.⁴⁸ Finally, in terms of *Overall Physical Activity*, consistent evidence of inequitable physical activity access for girls in comparison with boys in India⁴⁹ is reiterated in the 2022 IRC.^{16,17}

Although *Community and Built Environment* received a D grade, *Active Transportation*, which is intricately linked with built environment, was given the highest grade of the 2022 IRC (B-). This discrepancy can be explained by higher active transportation among rural children whose movement is not impacted by unsafe and restrictive built environment. Nevertheless, as India's population continues to become more urban with consistent economic growth,⁵⁰ it is critical to facilitate urban planning to improve active transportation, an approach⁵¹ that can minimize alarming levels of air pollution in Indian cities,^{52,53} and potentially mitigate climate change impacts.^{54,55}

Government Strategies received a higher grade (C+) in comparison with previous evaluations in 2016 (D) and 2018 (D), a promising sign that indicates a shift in the institutional strategy to tackle physical activity among children and adolescents in India.^{33,56} On the other hand, *Schools* was graded C, a challenge that needs to be tackled with more funding for school active living policies and programs as they are the ideal venues to promote equitable access to physical activity for children and adolescents.⁵⁷

4.1. Strengths and limitations

A significant strength of this study that it is the only comprehensive evaluation of numerous indicators of active living developed by AHKGA,⁸ including the culturally-relevant indicator, *Yoga*. This study also builds on the strengths of the 2016 and 2018 IRCs by conducting a systematic appraisal of both peer-reviewed and grey literature. More importantly, the study also utilizes primary data to validate peer-reviewed and grey literature. A key limitation of this study is the lack of data for four indicators of active living, and limited data for *Yoga*.

5. Conclusions

Based on the evidence generated by the 2022 IRC, it is critical to invest in active living research and policy, and to develop a national physical activity strategy for children and adolescents. Another key area of focus should be to minimize gender-based inequities by investing in educational campaigns to increase physical literacy among educators and families. In terms of local jurisdictional efforts, 2022 IRC findings reiterate the importance of reimagining how urban development is undertaken, because facilitation of safe active transportation can not only improve physical activity of children and adolescents, but also play a part in mitigating the impacts of climate change. Finally, for children and adolescents, schools are an ideal medium to implement active living policies and programs, thus they have a significant role to play in providing equitable access to physical activity for all Indian children and adolescents.

Author statement

Jasmin Bhawra and **Tarun R Katapally**: Conception of study design, acquisition of data, analysis and interpretation of data, preparation of first draft, draft revision, and manuscript approval. **Anuradha Khadilkar**: Acquisition of data, contributions to first draft, draft revision, and manuscript approval. **Krishnaveni Ghattu V** and **Kumaran K**: Contributions to first draft, draft revision and

final approval.

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Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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Appendix A

Table 1
Definitions and Benchmarks of the 11 Indicators of Active Living

Indicator	Definition	Benchmark
Overall Physical Activity	Any bodily movement produced by skeletal muscles that requires energy expenditure.	% of children and youth who meet the Global Recommendations on Physical Activity for Health, which recommend that children and youth accumulate at least 60 min of moderate- to vigorous-intensity physical activity per day on average. Or % of children and youth meeting the guidelines on at least 4 d a week (when an average cannot be estimated).
Organized Sports Participation	A subset of physical activity that is structured, goal-oriented, competitive and contest-based.	% of children and youth who participate in organized sport and/or physical activity programs.
Active Play	Active play may involve symbolic activity or games with or without clearly defined rules; the activity may be unstructured/unorganized, social or solitary, but the distinguishing features are a playful context, combined with activity that is significantly above resting metabolic rate. Active play tends to occur sporadically, with frequent rest periods, which makes it difficult to record.	% of children and youth who engage in unstructured/unorganized active play at any intensity for more than 2 h a day. % of children and youth who report being outdoors for more than 2 h a day.
Active Transportation	Active transportation refers to any form of human-powered transportation – walking, cycling, using a wheelchair, in-line skating or skateboarding.	% of children and youth who use active transportation to get to and from places (e.g., school, park, mall, friend's house).
Sedentary Behaviors	Any waking behaviour characterized by an energy expenditure ≤ 1.5 metabolic equivalents, while in a sitting, reclining or lying posture.	% of children and youth who meet the Canadian Sedentary Behaviour Guidelines (5- to 17-year-olds: no more than 2 h of recreational screen time per day). Note: the Guidelines currently provide a time limit recommendation for screen-related pursuits, but not for nonscreen-related pursuits.
Physical Fitness	Characteristics that permit a good performance of a given physical task in a specified physical, social, and psychological environment.	Average percentile achieved on certain physical fitness indicators based on the normative values published by Tomkinson et al. ⁵⁸
Family and Peers	Any member within the family who can control or influence the physical activity opportunities and participation of children and youth in this environment.	% of family members (e.g., parents, guardians) who facilitate physical activity and sport opportunities for their children (e.g., volunteering, coaching, driving, paying for membership fees and equipment). % of parents who meet the Global Recommendations on Physical Activity for Health, which recommend that adults accumulate at least 150 min of moderate intensity aerobic physical activity throughout the week or do at least 75 min of vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate- and vigorous-intensity physical activity. % of family members (e.g., parents, guardians) who are

(continued on next page)

Table 1 (continued)

Indicator	Definition	Benchmark
School	Any policies, organizational factors (e.g., infrastructure, accountability for policy implementation) or student factors (e.g., physical activity options based on age, gender or ethnicity) in the school environment that can influence the physical activity opportunities and participation of children and youth in this environment.	<p>physically active with their kids.</p> <p>% of children and youth with friends and peers who encourage and support them to be physically active.</p> <p>% of children and youth who encourage and support their friends and peers to be physically active.</p> <p>% of schools with active school policies (e.g., daily physical education (PE), daily physical activity, recess, “everyone plays” approach, bike racks at school, traffic calming on school property, outdoor time).</p> <p>% of schools where the majority ($\geq 80\%$) of students are taught by a PE specialist.</p> <p>% of schools where the majority ($\geq 80\%$) of students are offered the mandated amount of PE (for the given state/territory/region/country).</p> <p>% of schools that offer physical activity opportunities (excluding PE) to the majority ($>80\%$) of their students.</p> <p>% of parents who report their children and youth have access to physical activity opportunities at school in addition to PE classes.</p> <p>% of schools with students who have regular access to facilities and equipment that support physical activity (e.g., gymnasium, outdoor playgrounds, sporting fields, multipurpose space for physical activity, equipment in good condition).</p>
Community and Built Environment	Any policies or organizational factors (e.g., infrastructure, accountability for policy implementation) in the municipal environment that can influence the physical activity opportunities and participation of children and youth in this environment.	<p>% of children or parents who perceive their community/municipality is doing a good job at promoting physical activity (e.g., variety, location, cost, quality).</p> <p>% of communities/municipalities that report they have policies promoting physical activity.</p> <p>% of communities/municipalities that report they have infrastructure (e.g., sidewalks, trails, paths, bike lanes) specifically geared toward promoting physical activity.</p> <p>% of children or parents who report having facilities, programs, parks, and playgrounds available to them in their community.</p> <p>% of children or parents who report living in a safe neighborhood where they can be physically active.</p> <p>% of children or parents who report having well-maintained facilities, parks, and playgrounds in their community that are safe to use.</p>
Government Strategies	Any governmental body with authority to influence physical activity opportunities or participation of children and youth through policy, legislation or regulation.	<p>Evidence of leadership and commitment in providing physical activity opportunities for all children and youth.</p> <p>Allocated funds and resources for the implementation of physical activity promotion strategies and initiatives for all children and youth. Demonstrated progress through the key stages of public policy making (i.e., policy agenda, policy formation, policy implementation, policy evaluation and decisions about the future).</p>
Yoga	The proportion of children and youth who practice any type of yoga daily.	<p>HEPA PAT v2 and the scoring rubric published by Ward et al.</p> <p>% of children and youth engaging in any form of yoga practice (i.e., hatha, ashtanga) on a daily basis.</p>

Table 2
Grading Rubric

Grade	Benchmark	Definition
A+	94–100%	We are succeeding with a large majority of children and youth
A	87–93%	
A-	80–86%	
B+	74–79%	
B	67–73%	We are succeeding with over half of children and youth
B-	60–66%	
C+	54–59%	
C	47–53%	
C-	40–46%	We are succeeding with about half of children and youth
D+	34–39%	
D	27–33%	
D-	20–26%	
F	<20%	We are succeeding with very few children and youth
INC	Incomplete—insufficient or inadequate information to assign a grade	

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