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Exploring the world of active play: A comprehensive review of global surveillance and monitoring of active play based on the global matrix data

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ABSTRACT

A valid assessment tool that measures active play is not yet available due to the sporadic and spontaneous nature of play, as well as the potential differences in how active play is understood and measured across different age groups, cultures, and contexts. The purpose of this review was to identify the scope and gaps in the measurement of active play based on data gathered from 68 countries that participated in the Global Matrix (GM) initiative, led by the Active Healthy Kids Global Alliance (AHKGA). GM is the global-level, biennial evaluation system of physical activity related behaviors among children and youth, including the Active Play indicator, and the sources of influence using letter grades (ranging between "A" and "F"). Based on the identified scope and gaps, this study offers recommendations for future research dedicated to the measurement/surveillance of active play. Out of the 68 countries involved in the previous GM (2014–22), 55% of the grades remained unassigned due to insufficient data on the Active Play indicator. The high number of unassigned grades, combined with the absence of valid measurement tool, highlight a need for a standardized measurement tool for improved global data generation of active play among children and youth. Our findings emphasize the need to address challenges in measuring active play. This review offers future considerations, research recommendations specific to the GM initiative, and two sets of age- and location-specific (indoor and outdoor settings) questionnaire items along with guidelines for its use. Together, these elements provide a roadmap for guiding future research and evaluation efforts on active play.

1. Introduction

Motivated intrinsically, play is a voluntary engagement in activities that are fun and/or rewarding.[1] Active play, encompassing physical activity of varying intensities, particularly when it takes place outdoors, is acknowledged for numerous health benefits for children and youth. These benefits extend to improved physical, emotional, social, and mental well-being, as well as the development of climate resilience (i.e., ability to prepare for, recover from, and adapt to the impacts of climate change)[2] when engaged in outdoors.[2–4] Despite these benefits, children's opportunities for active play, especially outdoors—also known as active outdoor play—, have decreased over the past three decades,[5,6] replaced by sedentary, screen-based activities, which are associated with adverse effects on child development.[3,7,8] To highlight the importance of and to revive diminishing active outdoor play, leading researchers in Canada published the impactful Position Statement on Active Outdoor Play in 2015.[6] Following its release, research focused on active play showed a tenfold increase.[9,10] Moreover, the document played an important role in influencing a legal decision by the BC Supreme Court regarding a playground injury case—an opportunistic lawsuit that unfairly criticized outdoor play.[11]

Despite the growing interest in active play in public health research,[9,10] a globally harmonized measurement tool with established validity and reliability is currently unavailable. This gap may be due to the sporadic and spontaneous nature of active play,[12] as well as cultural and geographical variations influencing its perception and practice. For example, in East Asian countries, academic learning tends to replace active play due to the societal pressure on education, with parents' and

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Table 1
Definitions and Related Benchmarks for the Active Play Indicator in the Global Matrix (GM) initiative.

GM Round	Definition	Benchmark
1.0	freely chosen, spontaneous and self-directed physical activity involving an element of fun	% of children and youth who engage in unstructured/unorganized active play for several hours a day
2.0	freely chosen, spontaneous, and self-directed physical activity involving an element of fun done in the outdoors	
3.0	a form of gross motor or total body movement in which young children exert energy in a freely chosen, fun, and unstructured manner	% 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
4.0	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 adolescents who engage in unstructured/unorganized active play at any intensity for more than 2 h a day % of children and adolescents who report being outdoors for more than 2 h a day

Information available on the Active Healthy Kids Global Alliance Website (www.activehealthykids.org).

teachers prioritizing academic performance.[13,14] Conversely, Scandinavian countries have a collective culture that values nature connection and risk-taking for children's development,[15,16] creating a sociocultural environment conducive to active play. Furthermore, cultural variations in risk perception and children's safety influence parental concerns,[13,17] contributing to the absence of globally harmonized assessment of active play for global surveillance. Climatic features in different geographical locations also pose challenges to active outdoor play,[18,19] particularly in countries close to the equator, where extreme weather conditions or worsening air pollution make outdoor activities unsafe for children and youth, as observed in South Korea and China.[20–22]

The Global Matrix (GM) initiative, led by the Active Healthy Kids Global Alliance (AHKGA), assesses children and youth's participation in physical activity and its sources of influence across countries. Specifically, each participating country is responsible for developing its Report Card, addressing 10 common indicators related to physical activity, including the Active Play indicator. In the most recent Report Card development in 2022, active play was defined as "involving 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."[19] The definition section of the Active Play indicator also acknowledges the sporadic nature of play, marked by frequent rest periods, making it difficult to record.[19] Based on this definition, two recommended benchmarks were proposed for use: (1) % of children and adolescents who engage in unstructured/unorganized active play at any intensity for more than 2 h a day, and (2) % of children and adolescents who report being outdoors for more than 2 h a day.[19] However, the absence of standardized measurement tools has resulted in inconsistency in data across participating countries, with the highest number of incomplete grades for the Active Play indicator in previous GM rounds.[18,19,23,24]

To date, four biennial rounds of GMs were conducted[1] since 2014, involving 15 [24], 38 in 2016 [23], 49 in 2018 [18], and 57 countries in 2022.[19] Despite the guidance provided by the AHKGA, the absence of standardized measurement tool, along with cultural and geographical diversity related to active play, led to confusion regarding the type of activity being measured across countries. Furthermore, it was also noted that available data on active play lacked in quantity and quality.[19,25] For example, participating countries drew evidence from a range of activities, such as unstructured/unorganized active play, outdoor play, or outdoor time,[18] relying on self- or proxy-reporting. For more streamlined global surveillance and monitoring efforts, it is important to establish a standardized measurement tool on active play.[24] Given the heterogeneity in the active play data across different countries, the initial step is to examine the extent and gaps within the literature. The GM data offers a significant opportunity to explore this, as it represents comprehensive country-level data already collected and curated by each country's Report Card team participating in previous GMs. Therefore, the goal of this review was to examine the scope and gaps of the measures used to grade the Active Play indicator in different countries based on the data drawn from the GM initiative from the year of 2014–2022. In light of the identified gaps, this study also sought to offer recommendations for future global surveillance and monitoring research focused on active play, such as GM.

2. Methods

2.1. Global matrix (GM) and the active play indicator

Led by AHKGA, the GM initiative consists of participating countries to develop a Report Card on 10 common indicators (see Supplementary Table 1) for physical activity-related behaviours and the sources of influence[19] based on multiple sources, followed by a harmonized process to assign a letter grade ranging between "A" to "F". Incomplete grade (INC) is also available if an indicator cannot be graded for reasons such as insufficient data. The definitions and benchmark criteria for the Active Play indicator used to evaluate active play in each GM round are presented in Table 1 and the letter grades of the Active Play indicators from 68 countries across four GM rounds are provided in Table 2. Grading rubrics across GM rounds are also available in Supplementary Table 1. Detailed information about the method and process are also described elsewhere.[18,19,23,24,26]

2.2. Data collection and extraction process

Data collection and extraction were conducted between May and September 2022 by the second author (A-CS). Extracted data were validated by the first author (*E*-YL) for its accuracy. Data on the Active Play indicator from GM 1.0 (2014) to GM 4.0 (2022) were drawn from peer-reviewed academic papers and Report Cards published either in the *Journal of Physical Activity and Health*, *Journal of Exercise Science and Fitness*, or the AHKGA website (https://www.activehealthykids.org/), as well as the grey literature and public sources cited in Report Cards. For country Report Cards that did not provide information on items planned to be extracted, additional relevant materials were searched (e.g., long and short form of Report Card reports, academic posters, additional published Report Card papers, sources cited within Report Card documents).

For each Active Play indicator that received a letter grade (e.g., "A" refers to "succeeding with a large majority of children and youth" meeting the pre-defined benchmark for an indicator) (See Supplementary Table 1), information on the GM round, grade assigned, data source type and citation, type of activity measured, age range, sample size, measurement method, items used in survey questionnaire for grading (if applicable), validity and reliability information, challenges mentioned for grade assigned, definitions used, and recommendations were

[1] Global Matrix was not conducted in 2020 due to the COVID-19 pandemic.

Table 2
Letter Grades of the Active Play indicator Across GM rounds by country.

	GM 1.0	GM 2.0	GM 3.0	GM 4.0
Participating Countries (N = 68)	**n = 15**	**n = 38**	**n = 49**	**n = 57**
Number of Letter Grade Assigned	**5**	**17**	**20**	**30**
Number of INC Grade Assigned	**10**	**21**	**29**	**27**
Argentina				INC
Australia	INC	INC	INC	INC
Bangladesh			INC	
Belgium (Flanders)		C+	INC	
Botswana			D-	*C-*
Brazil		INC	D+	F
Bulgaria			C+	
Canada	INC	D+	D	D-
Chile		INC	INC	INC
China		D-	D+	*C-*
Colombia	INC	INC	INC	INC
Croatia				C
Czech Republic			D-	C
Denmark		INC	INC	B-
Ecuador			INC	
England (UK)	INC	INC	INC	INC
Estonia		INC	F	D
Ethiopia			B	B
Finland	D	C	C	*C-*
France			INC	C
Germany			D-	*C-*
Ghana	INC	B	B-	
Greenland				INC
Guernsey			INC	INC
Hong Kong SAR, China		INC	INC	D
Hungary				C
India		INC	*C-*	INC
Indonesia				F
Ireland	INC	INC		INC
Israel				INC
Japan		INC	INC	INC
Jersey			INC	INC
Kenya	C	B		
Lebanon			INC	INC
Lithuania			INC	B-
Malaysia		INC		INC
Mexico	INC	D-	INC	C+
Montenegro				B
Mozambique	C	D		
Nepal			INC	C+
Netherlands		B	B	
New Zealand	B	B-	C+	INC
Nigeria	*C-*	C	C	
Philippines				INC
Poland		INC	INC	INC
Portugal		D	INC	D+
Qatar		INC	INC	
Scotland (UK)	INC	INC	INC	INC
Serbia				B
Singapore				*C-*
Slovakia				*C-*
Slovenia		D	D	C
South Africa	INC	INC	INC	INC
South Korea		INC	INC	INC
Spain		C+	*C-*	B-
Spain (Basque Country)				INC
Spain (Extremadura)				INC
Spain (Region of Murcia)				B+
Sweden		INC	INC	INC
Taiwan (Chinese Taipei)			INC	F
Thailand		F	F	F
UAE		INC	INC	INC
United States	INC	INC	INC	INC
Uruguay			INC	INC
Venezuela		INC	INC	
Vietnam				INC
Wales (UK)		C	*C-*	C+
Zimbabwe		D+	D+	C+

Empty cells = not participated.

extracted. If a grade was not assigned on the Active Play indicator (indicated as "INC" grade), information on the GM round, reasons for an unassigned grade, and challenges/issues for grading were extracted. For each grade assigned, either a letter grade of INC, the definition of active play used by the country Report Card team, recommendations, and notes were also extracted.

2.3. Evidence synthesis

The total count of the letter grades and incomplete (INC) grades of the Active Play indicator was calculated. For each letter/INC grade, the data source(s) used for grade assignment were categorized into four different measurement types (i.e., *surveys, independent studies, device-based measures*, and *other*) and counted. For the *surveys* category, if the same survey was administered in different years, they was counted separately, as the measurement method and activity measured differed between the GM rounds. For example, if the survey that has the items on active play was administered in 2016, 2018, and 2020; these were counted as three separate *surveys*. However, if the same survey administered in the same year was used as data source by multiple GM rounds, the survey was only counted once toward the *surveys* category to avoid redundancy.

For *surveys* and *independent studies*, the representativeness of the sample was described in three categories (i.e., *representative, not representative,* and *unclear*). The source was considered *representative* when the authors explicitly mentioned the sample was representative or when a national sample was used. The source was considered *not representative* if the author explicitly mentioned the sample was not representative of the study population. The source was assigned *unclear* when no information was provided on sample representativeness. The measurement methods used for each entry in the *surveys* and *independent studies* categories were described in five categories: *subjective self-report, subjective proxy-report, subjective-unknown* (subjective but unclear if self- or proxy-reported), *combination* (more than one method used), and *unclear*.

The type of activity measured was described in seven classifiers: *active play, outdoor play, active outdoor play, unorganized/unstructured physical activity, mixed, other*, and *unclear* (i.e., not explicitly mentioned). Given that *active outdoor play* encompasses outdoor play activities involving physical activity at any intensity and is distinct from both active play and outdoor play,[1] data sources were categorized as *active outdoor play* if "active outdoor play" or "active and outdoor play" was explicitly mentioned. The categorization of activity type as *unorganized/unstructured physical activity* was based on the explicit use of this term in the source. It's important to highlight that while this term shares similarities with active play, there are nuanced distinctions. Specifically, unorganized/unstructured physical activity lacks the emphasis on imaginative or creative elements and does not inherently prioritize the elements of fun and enjoyment, as play typically does.[1] Sources were categorized as *other* when play-related activities were measured, such as access to playgrounds; however, the status of the play as being either active/inactive or indoors/outdoors could not be determined. The *mixed* category described the sources that measured more than one type of activity.

3. Results

3.1. Scope of the active play measurement

Of the data from 68 countries that participated in either or all four of the GM, a total of 159 grades were assigned to the Active Play indicator, 72 with a letter grade (A–F) and 87 with INC grades from 68 countries (Table 2). Many countries utilized more than one data source to assign grades for each GM round. A total of 108 sources were utilized for grade assignment. Detailed information about the data sources in each Round by different measurement types are described in Supplementary Table 2 (*Survey*), 3 (*Independent study*), 4 (*Device-based measure*), and 5 (*Other*).

Each data source cited was categorized into four data source types: *survey* (n = 51), *independent study* (n = 31), *device-based measure* (n = 1), and *other* (n = 25). For the surveys data source (Supplementary Table 1), the same survey was conducted in different years in three countries. Specifically, the Physical Activity and Fitness in China—The Youth Study (PAFCTYS) considered by China in GM 3.0[27] and 4.0,[28] LIITU study and School Health Promotion Study used in Finland's Report Card in 2016 (GM 2.0),[29] 2018 (GM 3.0)[30] and 2222 (GM 4.0),[31] and the ALADINO study considered by 2016 and 2018 Spain's Report Cards in GM 2.0[32] and GM 3.0,[33] respectively, were administered in multiple years and counted separately.

Device-based measure included the Feelfit accelerometer utilized by 2018 Thailand's Report Card in GM 3.0[34] (Supplementary Table 4). Data sources in the other category consisted of seven different types: *expert opinion/estimation* (n = 5), *grey literature* (n = 2), *subjective observation* (n = 1), *pilot study/unpublished* (n = 3), *research group consensus* (n = 1), *unclear* (n = 3), and *no data available* (n = 10) (Supplementary Table 5). For example, the *grey literature* category included the data from a national statistics on the society and culture considered by 2022 Indonesia's Report Card in GM 4.0[35] and a government report used in 2016 Netherlands' Report Card in GM 2.0.[36]

For each data source for *survey* and *independent study*, the representativeness of the sample and measurement method are reported in Table 3. Of the sources that explicitly reported a *representative* sample, five sources used a nationwide/national sample in Lithuania (GM 4.0), Netherlands (GM 4.0), New Zealand (GM 3.0), Portugal (GM 4.0), and Taiwan (GM 4.0).[37–41] If a study was conducted in a small city or based on a non-national sample, it was considered *non-representative*, such as the three independent studies utilized by India in GM 3.0.[42] Many sources did not report on the representativeness of the sample in the studies that informed their Report Card development; consequently, 18 (35%) *surveys* and 20 (65%) *independent studies* were categorized as *unclear*.

Most *surveys* (n = 19) and *independent studies* (n = 11) utilized *subjective self-report* as the measurement method. Nine *surveys* and three *independent studies* utilized *a more than two* methods, either differentiated by age or combined two methods for the entire sample. For example, the 2015 Food Consumption Survey used by 2016 Belgium's Report Card in GM 2.0 utilized proxy-report for children aged 3–9 years and self-report for children aged 10 = 17 years.[43] The 2022 Finland's Report Card also utilized both self-report with device-based data to grade the Active Play indicator.[31]

As for INC grades (n = 87), a lack of representative and/or national data were often cited as reasons for assigning INC grades for the majority of the countries and regions participated in the GM initiative.[18,19,23] Other challenges, including a lack of consensus on the definition and operationalization of active play, no single metrics, benchmarks, recommendations, guidelines, or measurement tools were also mentioned by several countries that participated in GM.[18,19,23]

The type of activity measured for each type of sources cited is described in Table 4. The most frequently measured activity type was *active play* (n = 30), followed by *outdoor play* (n = 17), *unorganized/unstructured physical activity* (n = 12), and *active outdoor play* (n = 4). The *unclear* category (n = 17) included sources that did not provide details on what activity was measured in any of their Report Card documents or publications. Sources were categorized as *mixed* (n = 15) when multiple types of activities were measured, most frequently active play in addition to outdoor play. No studies measured school/recess play alone but this was measured in conjunction with active play in 2018 Ghana's Report Card[44] and 2016 Thailand's Report Card.[45] Similarly, none of the sources cited measured indoor play alone but two sources in the *mixed* category: 1) the Parent Survey on Physical Activity and Sport data used in 2022 Canada's Report Card in GM 4.0 measured indoor play in conjunction with outdoor play[46] and 2) the GUSTO study data used in 2022 Singapore's Report Card in GM 4.0.[47] Several sources measured *other* activity types (n = 13), such as access to playgrounds in Ethiopia[48] or exercising during the summertime in Wales.[49]

Table 3
Sample representativeness and measurement method of the data sources used to inform the Active Play indicator in Global Matrix (GM) initiative (N = 108).

		Survey n = 51	Independent Studies n = 31
Representativeness (n)	Representative	31	3
	Non-representative	2	8
	Unclear	18	20
Measurement Method (n)	Subjective self-report	19	11
	Subjective proxy report	13	7
	Subjective-unknown	1	1
	Combination	9	3
	Unclear	9	9

Representativeness: *Representative* = the source explicitly mentioned the use of a representative sample or used nationwide/national samples; *non-representative* = the source explicitly mentioned the use of a non-representative sample; *unclear* = no information could be found on whether the sample was representative or not.
Measurement Method: *Subjective self-report* = child-reported data; *subjective proxy report* = either parent- or guardian-reported data; *combination* = a combination of self-reported, proxy-reported and/or objectively (device-based) measured data were used; *Subjective-unknown* = Subjective method was used, but unclear who reported the data; *unclear* = no information can be found on measurement method.

Table 4
Type of activity measured to inform the Active Play indicator in Global Matrix (GM) initiative (N = 108).

Activity type	Total count	Type of sources cited			
		Surveys (n = 51)	Independent studies (n = 31)	Device-based (n = 1)	Other (n = 25)
Active outdoor play	**4**	4	0	0	0
Active play	**30**	10	13	1	6
Outdoor play	**17**	9	7	0	1
Unorganized/unstructured physical activity	**12**	11	1	0	0
Mixed	**15**	7	7	0	1
Other	**13**	10	2	0	1
Unclear	**17**	0	1	0	16

Mixed = Multiple types of activities were measured, most frequently active play in addition to outdoor play; *other* = types other than the above were measured; *unclear* = No details were provided on what activity was measured in any of their Report Card documents or publications.

Table 5
Items and reported validity and reliability of the questionnaire items used to inform the Active Play indicator in Global Matrix (GM) initiative by type of sources.

Surveys (in an alphabetical order of country names)				
Country	Item(s)	Validity	Reliability	Reported in RC
Food Consumption Survey 2014-15				
Belgium	• % of children 3–9 years who engaged in active play yesterday (last weekday and weekend day)	NA	NA	Y
	• % of youth 10–17 years who participate in sports/play as main activity during playtime at school and during lunchbreak at school	X	X	Y
Canadian Health Measures Survey 2014-15				
Canada	• "About how many hours a week do they usually take part in physical activity that makes them out of breath or warmer than usual [outside of school/EMPTY] while participating in unorganized activities, either on their own or with friends?" with the following response options: Never; Less than 2 h per week; 2 to less than 4 h per week; 4 to less than 7 h per week; 7 or more hours per week	NA	NA	N
2016 Shanghai's Report Card Team Designed Survey 2014–2015				
China (Shanghai)	• Asked how many times during the past week they engaged in unorganized active and outdoor play (at least 60 min per occasion)	NA	NA	Y
Childhood Obesity Surveillance Initiative, Croatia (CroCOSI) 2018/2019				
Croatia	• Time children spend playing actively/vigorously during a normal week, outside school hours for weekends and weekdays with the following response options: Never at all; <1 h; 1 h; 2 h; ≥ 3 h	NA	NA	N
School Health Promotion study 2017				
Finland	• "During your spare time, how many hours per week do you usually engage in physical exercise that causes shortness of breath and sweating?" with the following response options: None; About 0.5 h; About 1 h; About 2–3 h; About 4–6 h; About 7 h or more (*Note*: Physical exercise is any activity that increases your heart rate and causes shortness of breath for a while, for example in sports activities, playing games with friends, on the way to or from school, at recess or in physical education class. Examples of physical exercise include brisk walking, running and cycling).	NA	NA	N
	• "Think about all the moving around you have done over the past 7 days. On how many days have you been on the move for at least 1 h per day?" with the following response options: On 0–7 days			
School Health Promotion study (Guardian survey) 2019				
Finland	• "How often has the child used the following services in leisure time during the past 12 months? (1) Recreation facilities (jogging tracks, school yards, playgrounds, etc.); (2) Supervised children's exercise (at a sports club, etc.); (3) Supervised art activity for children (including visual arts, music, architecture, crafts, theatre, literary art); (4) Clubs (scouts, 4H, cooking, crafts, etc.); (5) Cultural services for children (e.g., library, concerts, theatres); (6) Youth work (youth club, youth café, etc.) with the following response options: Almost daily; Every week; Every month; Less frequently; Never; The service not available	NA	NA	N
School Health Promotion study 2021				
Finland	• "During your leisure time, how many hours per week do you usually engage in physical exercise that causes shortness of breath and sweating?" with the following response options: None; About 0.5 h; About 1 h; About 2–3 h; About 4–6 h; About 7 h or more	NA	NA	N
	• "How often do you take exercise or participate in sports led by an instructor or on your own initiative in your leisure time? In instructor-led classes, training sessions or competitions/matches organized by a club or an organization/On my own initiative" with the following response options: Almost daily; Every week; Every month; Less frequently; Never			
	• "Think about all the moving around you have done over the past 7 days. On how many days have you been on the move for at least 1 h per day?" with the following response options: On 0 days–7 days			
Mo–Mo Study 2003–2012				
Germany	• "How often do you normally play outside during a week (for example: playing tag, skipping rope, or going to the swimming pool)" and an item about minutes spent on average during one of those days	NA	X	N
World Health Organization European Childhood Obesity Surveillance Initiative (COSI) 2015-17				
Lithuania & Portugal	• "In his/her free time, about how many hours per day is your child usually playing actively/vigorously (e.g., running and jumping outside, or moving and fitness games inside)? Please tick one box for weekdays and one box for weekend" with the following response options: Weekdays/Weekend; Not at all; Less than 1 h/day; About 1 h/day; About 2/day; About 3 or more hours/day	NA	NA	N
TNO Monitor Covenant Healthy Weight (MCGG) 2013				
Netherlands	• "How many days per week does your child play outside (outside school hours)?" with the following response options: Never of less than 1 day per week; 1 day per week; 2 days per week; 3 days per week; 4 days per week; 5 days per week; 6 days per week; 7 days per week; My child did not engage in outside play last week, but does so in a normal week.	NA	NA	Y
Health and Lifestyles Survey (HLS) Parent/Caregiver Survey 2016				
New Zealand	• "Is ___ allowed to go out on his/her own in the local neighbourhood?" with the following response options: Yes; No, only with other children; No, only with an older brother or sister; No, only with an adult; Don't know; Refused	NA	NA	N
National Survey of Children and Young People's Physical Activity and Dietary Behaviors in New Zealand (2008–2009)				
New Zealand	• Amount of time spent during the previous day participating in free play, which referred to any time playing for fun and not in an organized or structured way. Example activities include "mucking about", "running around", "playing with children", and "hacky sack".	NA	X	N
State of Play 2015				
New Zealand	• "How often does your child climb trees?"	NA	NA	N
	• "How often does your child engage in rough-and-tumble game (e.g., wrestling, bullrush)?"			
	• "How often does your child ride non-motorised vehicles in the neighbourhood?"			
	• "How often do you allow your child to play outside when it is raining?"			
Young People's Survey 2011				
New Zealand	• Amount of time spent on a normal day (for each day of the week) taking part in sport and recreation (doing sport and active things when "mucking around" with friends, family or on their own) each day of the week	NA	NA	N
CLASS Questionnaire used in ACDSi Study				

(*continued on next page*)

Table 5 (*continued*)

Surveys (in an alphabetical order of country names)				
Country	Item(s)	Validity	Reliability	Reported in RC
Slovenia	• Checklist of 30 physical activities. For each physical activity in the checklist, parents were asked to circle "Yes" or "No", indicating whether their child does that activity during a typical week (Monday to Friday) and during a typical weekend (Saturday and Sunday).	NA	X	N
Health Behaviur in School-Aged Children Wales Survey 2017-18				
Wales	• "During the most recent summer holidays, how often did you exercise in your free time so much that you got out of breath or sweated?"	NA	NA	Y
Play Sufficiency Child Survey 2018–2019				
Wales	• "How often do you go out to play or hang out with friends?"	NA	NA	Y
School Health Research Network Student Health and Wellbeing Survey 2019-20				
Wales	• "How often, during the most recent summer holidays, did you exercise in your free time so much that you got out of breath or sweated?"	NA	NA	Y
Independent studies (in an alphabetical order of country names)				
Country	Item(s)	Validity	Reliability	Reported in RC
Bertuol et al., *2019* (Bertuol et al., 2019)				
Brazil	• Students answered one question on the preferred leisure activity, organized into six groups of activities (one being physical activity) – among 15-19-year-olds	X	NA	N
da Silva et al., *2019* (da Silva et al., 2019)				
Brazil	• The practice of physical activity was determined through the Physical Activity Questionnaire for Adolescents, by type, frequency, duration and weekly volume	X	NA	N
	• "In a normal week, do you go to these places near your residence (10–15 min walking) to practice any physical activity?" with the options of answers for the places included park, square, walking/running track, cycle paths, soccer fields, gymnasiums or sports courts, gyms, clubs, outdoor gyms, skateboarding bowls, school and others ranged from 0 to 7 days/week	X	NA	N
Fitsum et al., *2021* (Fitsum et al., 2021)				
Ethiopia	• had the habit of playing in their compound (Y/N)	NA	NA	N
Mohammed et al., *2020* (Mohammed et al., 2020)				
Ethiopia	• a playground nearby your residence (Y/N)	NA	NA	N
Hasanen et al., *2021* (Hasanen et al., 2021)				
Finland	• Children's outdoor physical play was assessed alongside other nondigital media activities, such as indoor play and helping with simple household chores. Examples were "playing 'hide-and-seek' or 'tag', climbing, playing ballgames	X	NA	Y
	• Parents were also asked to report about their child's physical activity and play on a typical weekday and weekend day outside of the preschool. This included the duration spent on various indoor activities (non-screen reading and drawing), indoor play and outdoor play, and an estimated apportion of time their child spent on moderate-to-vigorous activities, which caused their child to breathe harder and faster.			
Kovacs et al., *2021* (Kovacs et al., 2022)				
Hungary, Slovenia	• Playing outside more than 2 h per day	NA	NA	N
Bharati et al., *2008* (Bharati et al., 2008)				
India	• Amount of time spent on outdoor games	NA	NA	N
Mukherjee et al., *2014* (Mukherjee et al., 2014)				
India	• Average hours total; % playing outdoors; % playing indoors	NA	NA	N
Lee et al., *2016* (Lee et al., 2016)				
Mexico	• days of outdoor play (number of days that a child played outdoors for ≥30 min)	NA	X	N
Martínez-Andrade et al., *2014* (Martínez-Andrade et al., 2014)				
Mexico	• Staff assisted parents in reporting the average time the participating child spent in pre-specified active and sedentary activities during the week and on weekends. For each of the pre-specified activities parents reported time spent in open-ended response format. From these responses we derived total hours/week of physical activity composed of active play (e.g., running, jumping, walking, playing ball, playing in the park, biking, swimming, dancing)	NA	NA	N
Van Kann et al., *2015 (Van Kann* et al., *2015)*				
Netherlands	• "On how many days per week do you play outdoors? (Open)" and a question on the duration	NA	NA	N
Adeniyi et al., *2011* (Adeniyi et al., 2011)				
Nigeria	• "In the last 7 days, on how many days right after school, did you do sports, dance, or play games in which you were very active?"	X	NA	N
	• "In the last 7 days, on how many evenings did you do sports, dance, or play games in which you were very active?"			
	• "On the last weekend, how many times did you do sports, dance, or play games in which you were very active?" with the following response options: None, 1 time last week, 2 or 3 times last week, 4 times last week, 5 times last week			
Oyeyemi et al., *2016* (Oyeyemi et al., 2016)				
Nigeria	• Leisure-time PA in minutes per week	X	X	N
do Carmo et al., *2020* (do Carmo et al., 2020)				
Portugal	• Results were reported as active play (<1 h/day, ≥1 and < 2 h/day, ≥2 and < 3 h/day, ≥3 and < 4 h/day, and ≥4 h/day)	X	X	N
Rukuni et al., *2021* (Rukuni et al., 2021)				
Zimbabwe	• Outdoor time >2 h per day	NA	NA	N

X = Found information for validity or reliability of the questionnaire/study; Y = Questionnaire item was explicitly reported by Report Card teams in either published paper or short/long forms; N = Questionnaire item was not explicitly reported by Report Card teams but were found in original data sources and aligned most closely with activity measured; NA = no information was available.

3.2. Scope of the existing questionnaire items of active play

The type of questions asked to measure active play varied considerably across data sources and countries. Furthermore, the lack of clarity in specific questionnaire items considered for grading in Report Cards appear to be further creating confusion and inconsistency in the grading of the Active Play indicator in previous GMs. The questionnaire items, reliability/validity, and whether the specific question was reported by Report Card teams to inform grading from 33 sources in 20 countries are reported in Table 5.

A portion of the data sources evaluated the Active Play indicator using questionnaire items that asked about the frequency or duration of play-related activities. However, some items assessed minutes per day while other items assessed hours or days per week. For example, the 2014–2015 Canadian Health Measures Survey[50] used by 2018 Canada's Report Card (GM 3.0) included the item "*About how many hours a week do they usually take part in physical activity that makes them out of breath or warmer than usual while participating in unorganized activities, either on their own or with friends?"*. Conversely, the 2015–2017 WHO European Childhood Obesity Surveillance Initiative Survey[51] used in 2022 Lithuania's Report Card (GM 4.0) included the item "*In his/her free time, about how many hours per day is your child usually playing actively/vigorously (*e.g.*, running and jumping outside, or moving and fitness games inside)?*".[52]

In some GM rounds, the sources cited included questions/items that did not necessarily measure active play but instead other play-related activities. For example, the item "*Is there a playground nearby your residence?"* was found in a source[53] considered by 2022 Ethiopia's Report Card (GM 4.0).[48] Similarly, a source used for 2022 Brazil's Report Card (GM 4.0)[54] included the item "*In a normal week, do you go to these places near your residence (10–15 min walking) to practice any physical activity?*" accompanied by a list of places (e.g., parks, gym).[55] 2018 New Zealand's Report Card (GM 3.0)[38] graded the Active Play indicator based on the percentage of children allowed to go out on their own in the neighbourhood. They also considered the item "*Is ___ allowed to go out on his/her own in the local neighbourhood?*" in the 2016 Health and Lifestyles Survey conducted by the Health Promotion Agency.[56] There were considerable differences across the questionnaire items considered for grading, making comparisons of results very difficult and tenuous.

Among the questionnaire items extracted from data sources, only 12 reported information on validity and/or reliability and most Report Card publications only reported the results in duration or frequency, without reporting the specific questionnaire items. In addition, only three of the 12 questionnaire items have been explicitly reported by the Report Card teams to have been considered for grading. In other words, it is unclear if the other seven valid/reliable questions were considered for grade assignment of the Active Play indicator. Instead, the seven questionnaire items were only mentioned in the data source cited or aligned most closely with the Active Play benchmarks. For example, the three questions extracted from the source[57] in 2016 Nigeria's report Card (GM 1.0)[58] were found in the original paper and aligned closely to the Active Play benchmarks. Otherwise, the source cited only reported results of active play activities without specifying the question items. For example, the source used for 2022 Portugal's Report Card (GM 4.0)[40] reported the frequency of active play only without the information on the measurement itself.[59]

Five questionnaire items were explicitly reported that they informed the grade assignment of the Active Play indicator; however, validity/reliability information were not available (Table 5). Three data sources reported specific items related to the frequency of play. First, the 2014–2015 Report Card Team Designed Survey that asked "*How many times during the past week they engaged in unorganized active and outdoor play (at least 60 min* per *occasion)*" was considered by China in GM 2.0 (Liu et al., 2016). Also, 2016 Netherlands' Report Card[60] considered the item "*How many days* per *week does your child play outside (outside school hours)? Consider last week*" utilized in the TNO Monitor Covenant Healthy Weight (MCGG) survey. Lastly, the Wales Report Card team reported "*When asked if they played outside most days, 42% of children aged 5–17 years reported that they did and 33% of children reported playing outside a few days each week*" when considering data from the 2018–2019 Play Sufficiency Child Survey.[61] While the Wales Report Card team also specified two other questionnaire items, they were focused on behaviours in the summer holidays. For example, the item "*During the most recent summer holidays, how often did you exercise in your free time so much that you got out of breath or sweated?*" was asked in the Health Behaviour in School Aged Children Wales survey.[61]

4. Discussion

Informed by the global data drawn from 68 countries that participated in the AHKGA's GM initiative in the past decade, this study synthesized the scope and gaps in the data used to inform the evaluation of active play, including the questionnaire items used to collect data in different countries when reported. Of the countries that attempted to grade the Active Play indicator, 55% (87/159 grades) were graded as INC due to insufficient data. The high number of INC grades assigned highlights a need for a standardized measurement tool for improved global data generation of active play among children and youth. When a letter grade was assigned, 42% of the data were based on representative samples while 46% of the data were unclear due to the lack of reporting. In terms of the measurement method, 61% solely relied on subjective measures (either self- or proxy-reported data). Furthermore, the questionnaire items extracted varied considerably in the activity type measured, reliability/validity, and metrics (i.e., frequency and duration).

Based on the evidence synthesis, this study suggests the following six considerations for future questionnaire development and research on active play: consideration of (1) established terminology; (2) diversity in play location; (3) different climate and settings; (4) age-specific active play questionnaire item(s); (5) culturally relevant adoption for different countries; and (6) equity, diversity, inclusion, and accessibility (EDIA). This study also provides guidelines for the data collection and reporting of the active play data in future GM initiative. Finally, this study provides two sets of age- and location-specific questionnaire items for the measurement of active play that researchers can use with guidelines on the use of the items and reporting. It is important to note that these questionnaire items should be translated as needed and modified and tested for psychometric properties upon their use in each country/study.

4.1. Six considerations for future research

4.1.1. Consideration 1: Item(s) based on established terminology

Across the four GM rounds, more than 50% of the eligible grades for the Active Play indicator received an INC grade because of insufficient data, such as a small sample size, non-representative data, or data limited to a specific age range. When graded, inconsistency and confusion in defining, operationalizing, and quantifying active play also compromised data quality and coherent evaluation for several countries. The inconsistency between the terminology and questionnaire items from data sources with the benchmark proposed for use by the AHKGA also made it challenging for Report Card teams to assess active play. To facilitate the fulsome evaluation of the Active Play indicator, the definition of active play based on the international consensus, *a form of play (i.e., voluntary engagement in activity that is fun and/or rewarding and usually driven by intrinsic motivation) that involves physical activity*[1] should be consistently used in future research and surveillance efforts. Further, development and use of a valid and reliable measurement tool that also align with the AHKHA's benchmarks in future national, representative sample-based surveys will enable cross-country comparisons.

4.1.2. Consideration 2: diversity in location for active play

While the sporadic and spontaneous nature of active play makes it difficult to measure and quantify, this offers an opportunity for children

to engage in physical activity at a variety of locations. Specifically, multiple countries recommended that schools offer more active play opportunities by maintaining and increasing the length and frequency of school recesses/breaks,[45,60,62–66] or incorporating play into mandatory physical education classes.[67] For example, the Wales Report Card team also recommended that schools make safe and secure school grounds accessible outside of school hours, including weekends.[68] Other countries also highlighted the variety of settings where active play may occur, such as in the home, city streets, childcare, and recreational places.[48,63,69,70] The 2016 Japan's Report Card noted that active play can also occur indoors, such as playing with blocks or ball toss for Japanese preschool and primary school children.[71] The 2022 Canada's Report Card also highlighted the importance of indoor active play for children with limited mobility.[46] Given these, items for measuring active play should consider various contexts and not be confined to one singular location, particularly within a global context.

4.1.3. Consideration 3: different climate, different setting

The evidence outside[17] and from GM[72] noted that geographical differences in weather and climate could influence active play, particularly when done outdoors. Countries such as China, Singapore, South Korea, Taiwan, Thailand, and UAE have reported barriers to outdoor play due to hot, humid, or polluted environments.[18–20,73–75] Similarly, the 2018 US Report Card also noted that extreme temperatures and rainy or inclement weather are barriers to active play.[64] Furthermore, 2018 Qatar's Report Card mentioned that the hot climate most of the year and poor road conditions are major reasons for not grading the Active Transportation.[76] Although not mentioned specifically for active play, the unsafe outdoor environment likely presents as a barrier to active outdoor play and activities for Qatari children.[18] Countries with increasingly high air pollution, such as South Korea, also did not grade the Active Play indicator; however, increasingly worsening air quality due to pollution was mentioned in their 2022 Report Card.[20] Combined, climatic and environmental barriers to active play outdoors highlighted in several countries highlight the need for measuring active play indoors. Thought health benefits may be unclear compared to outdoor play,[17] indoor spaces should be included as a viable location for active play, especially in countries with unfavorable outdoor environments. Cultural-specific activities done indoors should also be explored and considered when investigating active play.

4.1.4. Consideration 4: age-specific active play

A difference between the type of active play engaged in by younger children versus adolescents were highlighted in the GM data.[45,77] Children may develop an interest in age-appropriate activities and participate less frequently in active play as they age.[45,78] Using more inclusive language to describe active play may better capture active play behaviors across the childhood years. For example, the 2016 Australia's Report Card team recommended using "active play" and "free play" for younger children and "nonorganized" and "leisure" activities for adolescents.[79] Data collection method among participants should also be different by age. Specifically, self-report can be used for children aged 8 and 17 years, as shown in previous studies where children above seven years demonstrate adequate understanding and reliability/validity of self-reporting.[80] Furthermore, to facilitate reporting on active play among younger children (7 years and under), proxy-report can be utilized. Depending on the location of data collection, proxy-reported data can be collected from parents/guardians, teachers, early child educators, childcare practitioners, or child support workers. It is also important to note that, depending on the location of data collection, data may be limited to a specific context (e.g., home, childcare facilities).

4.1.5. Consideration 5: culturally and contextually relevant adoption for different countries

There are cultural differences in what constitutes active play. For example, while not used in grade assignment, 2022 Philippines' Report Card used a study that measured free play in the form of traditional games, such as *patintero and tumbang preso*.[81] Similarly, the Mozambique's and Indonesia's Report Card also discussed children participating in traditional or folk games.[35,82] Future surveys should also consider the lived experiences of children in various settings. For example, the 2022 South Africa's Report Card highlighted that "street play" may better reflect the lived experiences of children in low- and middle-income countries.[83] Therefore, when listing examples of active play activities in questionnaire items, future studies can incorporate traditional active games or street play activities to better reflect and prompt children's play behaviours that are unique to specific contexts. Several Report Cards also suggested the need for incorporating perspectives from children and youth in research around active play by actively involving them in the research process.[31,35,41,60,61] Below, examples of population- or context-specific or culturally relevant activities operationalized as active play drawn from the GM data are described. These can be added as a note to country-specific questionnaire items. It is important to note that the examples only include those mentioned by Report Cards. Collecting data on what constitutes active play in different populations, contexts, and cultures is important for future work.

4.1.5.1. Active indoor play. Active indoor activities such as dancing around the living room, garage fitness challenges, rough and tumble play were suggested by Australia,[79] playing hide-and-seek, household chores, or tag in Finland,[84] indoor fitness games in European countries,[52] or playing with large blocks and ball toss in Japan[71] were mentioned as examples of active indoor play.

4.1.5.2. Active outdoor play. Examples of active outdoor play mentioned by Report Cards included street or ice hockey in Canada,[46] kicking a ball against the wall, playing a game of tag with friends, skipping, watering the plants, playing on fixed equipment at a park, or running around with your dog at the park,[77] or running or jumping outside in European countries.[52] Traditional games may include *patintero and tumbang preso* in the Philippines.[81] Furthermore, based on the South Africa's Report Card, active play that takes place on streets can also be included as examples.[83] The examples provided in the questionnaire items should be age-specific as active outdoor play may look very different by age. For example, a common play among children in Taiwan and South Korea, *red and green lights* is typically played by young children.

4.1.6. Consideration 6: integration of the EDIA principle

Expansion of the GM initiative have facilitated an improved understanding of physical activity for children and youth in diverse populations. For example, 14 countries and regions followed similar grading methods and processes to publish their Para Report Cards alongside the GM 4.0 Report Cards.[85] However, there continues to be research and data gaps in active play among children and youth with disability. This was evident in 22022 Para Report Cards where only three of the 14 countries assigned a grade to the Active Play. Limited data on active play was also observed for other population groups. For example, 2022 Canada's Report Card mentioned that there is no nationally representative data on active play for Indigenous, racialized, and 2SLGBTQ + children and adolescents.[46] Underrepresentation of these children and youth in studies and global initiatives like GM resulted in a general lack of data across GM 4.0 [19]. Therefore, ensuring EDIA (as well as Indigeneity in countries with a history of colonization and settler colonialism such as Australia, Canada, and New Zealand) in research can help us better understand levels, patterns, and trends of active play that are reflective and inclusive of the diverse children and adolescent population. One example of such effort is to use inclusive languages and translation of questionnaire items into different languages. Furthermore, the operationalization of active play among children and youth living with disabilities inclusive of physical disability, disability related

to learning, cognition, or communication, chronic pain or illness, neurodiversity.

4.2. Proposed questionnaire items of active play for validation in different languages and contexts

Based on the questionnaire items used for grading in previous GM initiatives (Table 4) and the benchmarks provided by the AKHGA for grading the Active Play indicator (Table 1), we propose two sets of questionnaire items for further validation research across diverse languages, contexts, countries, and population groups. It is important to clarify that these items are not intended for immediate use; rather, they are introduced for each Report Card team to undergo a rigorous validation process before potential implementation. This is particularly pertinent in the absence of relevant measures or data in preparation for the 2026 Report Card development efforts. While these items may also find utility in independent studies examining active play among children and adolescents; it is imperative that their validity is established and reported with the presentation of the active play data.

For the validation and use of these items, a systematic and thorough process must be undertaken. Firstly, recognizing that variations in active play across countries can be influenced by weather conditions and cultural attitudes and norms,[52] the questionnaire items must be adapted with careful considerations of context-specific and culturally relevant characteristics for the population under being studied. This includes tailoring examples of play activities and considering the location. After refining items unique to each culture/country, researchers must conduct a systematic survey instrument translation and validation process[86] when necessary, ensuring that details are reported comprehensively to facilitate international efforts in active play surveillance and monitoring. This process involves adapting language, content, and context to align with the cultural norms and characteristics of the target population.

Upon completion of the questionnaire translation process, necessary validation process must be followed, using proxy-report for children aged 2–7 years and self-report for children and adolescents aged 8–17 years.[80] The validation process may encompass establishing content validity through expert reviews and feedback, assessing the relevance and representativeness of each item for the studied population. Criterion-related and convergent/divergent validity can be supplemented using direct observation and by examining correlations with measures assessing unrelated constructs, such as unorganized/unstructured physical activity. Test-retest reliability is essential to ensure the stability of the questionnaire over time in each location. Finally, pilot testing of the questionnaire items in a small sample is requisite before full-scale implementation. Below, we propose four age- and location-specific questionnaire items on active play with considerations for cultural and contextual adaptation.

4.2.1. For 2-10 year-olds (two proxy-report items)

- In the last week, how many minutes per day on average has your child engaged in active **outdoor** play outside of physical education classes or structured sports participation?
  (Note: active outdoor play is a form of play that involves physical activity and takes place outdoors, in the fields, at school yards, playgrounds, neighbourhood parks, or nearby nature. Think of activities such as … (insert context and culturally relevant examples).
- In the last week, how many minutes per day has your child engaged in active **indoor** play outside of physical education classes or structured sports participation?
  (Note: active indoor play is a form of play that involves physical activity and takes place indoors, at school gyms, childcare, community centres, or in the classroom during recess. Think of activities such as … (insert context and culturally relevant examples)).

4.2.2. For 11-17 year-olds (two self-report items)

- In the last week, how many minutes per day on average have you engaged in non-organized physical activity **outdoors**?
  (Note: any physical activity that is not part of organized physical activity or sport, that is not restricted by extrinsic rules usually set and governed by adults. Think of activities such as … (insert context and culturally relevant examples)).
- In the last week, how many minutes per day have you engaged in non-organized physical activity **indoors**?
  (Note: any physical activity that is not part of organized physical activity or sport, that is not restricted by extrinsic rules usually set and governed by adults. Think of activities such as … (insert context and culturally relevant examples)).

4.3. Recommendations for future GM initiatives

To further support active play research and evaluation, we make the following three recommendations on the reporting of the Active Play indicator specifically for future GM initiatives.

1. *Consistency in reporting:* To facilitate more precise comparison of the global data on active play, future GM initiatives and research should use a consistent reporting method on the data sources considered for grading, questionnaire items utilized in data source cited, psychometric properties of the items used, and declaration of an absence of such information, age range studied or considered for synthesis, and measurement method (e.g., proxy- or self-report) used. Furthermore, consistency of reporting between published manuscripts and Report Cards report document can also facilitate more coherent global data synthesis for the development of accurate advocacy documents.
2. *Innovation in the assessment of active play*: Objective measure has long been a challenge in active play assessment, primarily due to the sporadic and spontaneous nature of active play.[1,87] The 2018 Thailand's Report Card[34] graded the Active Play indicator using the Feel-fit accelerometer, with no psychometric properties were provided. Device-based measures, such as accelerometers, are recognized as superior tools for measuring physical activity compared to reliance on self- or proxy-reported data.[88] However, while device-based measurements offer precision, their efficacy in assessing active play specifically remains largely unexplored. Acknowledging the potential limitations of singular measures, a combination of methods, such as integrating device-based measurements with direct observation, emerges as a promising avenue. While this approach holds the potential to enhance the accuracy of active play data, it is crucial to acknowledge the associated challenges—namely, the considerable time and labor intensity required for simultaneous device-based measurement and direct observation. Nevertheless, innovation in active play assessment demands a holistic approach, striving for a balance between precision and practicality in capturing the dynamic and spontaneous nature of children's active play, while also taking into account the contextual nuances, such as the specific location of these activities.
3. *Standardization of the final publication:* Each participating country in GM 1.0, 2.0, and 3.0 published their Report Card manuscript describing the process and outcome in peer-reviewed journals collectively. However, the information provided varies significantly across countries and GM rounds. Furthermore, extracting data from Report Cards in GM 3.0 was challenging in due to the limited information provided on the one-page Report Card paper. While some countries provided a long-form report document on the AHKGA website with the detailed information on the data used and analyses, not all countries developed a long-form report and, when published, some reports were only available in their native language and not available in English. Similarly, extracting data from Report Cards in GM 4.0 was also challenging as only a few countries published

Report Card papers or detailed Report Cards report documents. Ensuring standardized final publication in future GM can be helpful for obtaining quality and consistent global data on not just active play but other indicators that are part of the comprehensive evaluation of physical activity-related behaviors and the sources of influence in different countries.

4.4. Strengths and limitations

A major strength of this study is the use of global data drawn from a total of 68 countries, consisted of 159 grades on the Active Play indicator across four rounds of the GM initiative from 2014 to 2022. The variations in the letter grades assigned on the Active Play indicator across countries provide an opportunity for knowledge exchange and capacity building. In addition, this study recommends two sets of age- and location-specific questionnaire items to support the measure and reporting of active play in future studies. The combination of the recommended items with context-specific and culturally relevant instructions informed by the countries that participated in the previous GM initiative can further support global efforts in measuring, reporting, and comparing the levels, patterns, and trends of active play. Moreover, the questionnaire items proposed in this study to assess active play in both indoor and outdoor settings will facilitate researchers in conducting meaningful international comparisons regarding its prevalence as well as their unique benefits and potential risks to health. Therefore, it is important to incorporate assessments of active play in both indoor and outdoor settings in future standardized tool development.

Nevertheless, this study has limitations. High numbers of INC grades across GM rounds limited the amount of data available to inform the recommended questionnaire items; however, given that there are no valid items available to measure active play among children and youth, researchers are recommended to use the developed items in the interim until a valid and reliable active play measurement becomes available for use. When using the recommended questionnaire items, researchers must meet the three criteria provided in this work in their data collection and reporting practices to ensure that their active play data are useable for primary and secondary purposes. Secondly, several original sources used in country Report Cards were either missing citations, unable to be accessed, or were not published in English. Similarly, for the questionnaire items used to inform grade assignment, there was uncertainty in which questionnaire item was used to assess active play in many independent studies and surveys cited in country Report Cards. Belgium, China, the Netherlands, and Wales are the few countries that have clearly reported specific questionnaire items considered for assessing the Active Play indicator (See Table 4). Finally, among the four GM rounds, only one country, Thailand, utilized device-based measures to inform the grading of the Active Play indicator. However, limited information was available for data synthesis for this review. While quantifying active play can be improved by device-based measurement tools such as accelerometers, report-based measurement can also provide contextual information, such as the type or place of play, to help distinguish active play from other forms of physical activity.[12]

5. Conclusion

A decreasing trend of active play is a global concern, and addressing it requires global collaboration efforts on monitoring and evaluation. Our comprehensive review of the measures used to inform the Active Play indicator in previous GM initiatives from 68 countries provided insights into future active play research. We have identified the challenges and inconsistencies in measuring and reporting the active play data globally, and these findings provide a strong foundation for future initiatives aimed at promoting active play among children and youth. To address the prevalent issue of measurement inconsistency found in this review and lack of valid measurement tool at the current state, there is a clear need for the development and implementation of standardized measurement tools for active play that encompass both outdoor and indoor activities, accounting for different age groups, cultural variations, and specific barriers in different geographical locations. Given the variations in how active play is understood and operationalized across different cultures and regions, researchers should collaboratively modify age-specific questionnaire items provided in this review and follow the systematic translation and validation process to capture the essence of active play in their respective countries before adoption.

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Data availability statement

All data used in this review is available publicly.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jesf.2024.03.008.

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