

Article

Playground Design Matters: A Cross-Sectional Study on the Association Between Playground Features and Children's Usage

Sander Blikendaal ^{1,*}, Elise Peters ², Sander Aldershof ¹ and Dinand Ekkel ¹¹ AERES University of Applied Sciences Almere, 1325 WB Almere, The Netherlands² Research Group Urban Care and Education, Windesheim University of Applied Sciences, 1315 RC Almere, The Netherlands

* Correspondence: s.blikendaal@aeres.nl

Abstract: This study aimed to evaluate the associations between playground features and utilization. Following a cross-sectional study design, we assessed the features of 38 playgrounds using the Play Space Audit Tool (PSAT). Thereafter, we monitored the playground utilization by children (0–12 y) using a headcount approach during multiple site visits. Generalized Estimating Equations regression models were used to analyze the associations between the PSAT scores and playground utilization. Significant associations were found between the PSAT scores ‘overall’, ‘path’, and ‘play structure’ and playground utilization. For boys specifically, their playground usage was positively related to the scores ‘overall’, ‘general amenities’, and ‘play’. For girls, their playground usage was positively related to the scores ‘overall’, ‘path’, and ‘play structure’. In conclusion, the ‘overall’ and ‘play structure’ PSAT scores were robustly associated with higher playground utilization, and the associations for domain scores vary between boys and girls. The outcomes enforce that playgrounds of higher quality attract more children.

Keywords: physical activity; outdoor play; children; public space; urban



Academic Editor: Thomas W. Sanchez

Received: 14 March 2025

Revised: 6 May 2025

Accepted: 13 May 2025

Published: 20 May 2025

Citation: Blikendaal, S.; Peters, E.; Aldershof, S.; Ekkel, D. Playground Design Matters: A Cross-Sectional Study on the Association Between Playground Features and Children's Usage. *Urban Sci.* **2025**, *9*, 177. <https://doi.org/10.3390/urbansci9050177>

Copyright: © 2025 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

The United Nations Convention on the Rights of the Child in 1989 recognized play as a fundamental right for children [1]. This recognition underscores the critical role of play in fostering children's social, emotional, and physical development [2–6]. Providing adequate play opportunities for children is therefore essential [7], and outdoor public play spaces may provide these. Unfortunately, outdoor play opportunities are increasingly threatened by societal developments such as digitalization and urbanization [3,8,9]. Consequently, evidence suggests declining rates of daily playtime and overall physical activity among children [10]. This trend can be considered a latent health risk for upcoming generations.

Environmental factors of outdoor play spaces have a major influence on the play behavior of children [7,11–14]. For example, the availability of sufficient play spaces within the children's living area is crucial for outdoor play [8], as most of the outdoor play activities occur there [15]. Beyond proximity, specific features of playgrounds, such as a thoughtful spatial layout and design, are essential in encouraging play behavior [16–18]. More specifically, the literature indicates that innovative design [19], tailored design [20], size [21], and the number of play structures [17,22–24] are associated with overall playground usage. However, evidence suggests that the importance of those features may vary between boys and girls [17,25]. Given that girls spend less time in public playgrounds and play different types of play than boys [26,27], it is crucial to understand gender differences in how playground features correlate with children's actual playground usage.

Given the importance of playground features in facilitating play opportunities for children, multiple playground audit tools have been developed in the past few decades to assess playground environments objectively [28]. While those audit tools vary in their characteristics, they all cover an assessment of playgrounds' surroundings and accessibility, safety and security, opportunities for sports and play, as well as environmental aesthetics and comfort [28].

The underlying assumption of these audit tools is that playgrounds that score higher on the audit tool are more appealing to children and encourage a greater number of children to play there. If this is the case, it highlights the important role of audit tools in identifying strengths and areas for improvement in playground design, which is particularly useful when professionals are prioritizing playgrounds for renovations. Such tools are valuable, as monitoring playground usage manually is a labor-intensive and expensive procedure [29]. However, only a few audit tools have been tested for their ability to correlate outcomes with the actual usage of public playgrounds [17,23]. Therefore, there is limited insight into how specific playground features are related to playground usage, including potential gender differences. To bridge that gap, this study evaluated the associations between playground features and their usage. We hypothesized that playgrounds with more and better features tend to have a higher utilization.

2. Materials and Methods

2.1. Study Design

In this cross-sectional study, we evaluated the association between playground features and children's playground usage. We collected data during site visits in September and October 2024 in Almere, The Netherlands, using an audit instrument and, subsequently, a headcount approach. We used the mobile app ArcGIS Field Maps (v25, ESRI, Redlands, CA, USA) for data acquisition. The procedure was approved by the ethical committee of Aeres University of Applied Sciences (#AeresUAS-2024-12-01).

2.2. Playgrounds

As we were interested in regular playgrounds in the children's direct living area, playgrounds were selected on the following criteria: the playground is a formal publicly accessible playground; the playground is located within a neighborhood in direct proximity of houses; there is at least one play equipment present in the playground; the playground is not part of a park, large central playgrounds, schoolyard, or courtyard. We selected four areas, within a 15 min cycling distance from our university, in which a total of 38 suitable playgrounds were identified and included in this study; see Table 1 for the playground and neighborhood characteristics.

Table 1. Characteristics of the playground and neighborhoods.

Characteristic	Mean (Min–Max)
Playground (N = 38)	
Size (Ha)	0.13 (0.01–0.5)
PSAT	
Overall	16.6 (7–24)
General amenities	2.2 (0–5)
Surface	0.8 (0–1)
Path	6.3 (0–9)
Play structure	6.9 (3–13)

Table 1. *Cont.*

Characteristic	Mean (Min–Max)
Neighborhood (N = 13)	
Size (Ha)	26 (9–33)
Inhabitants (N)	1896 (640–2840)
Children (%)	17 (15–19)
Population density (inhabitants/square km)	7.843 (5.875–10.412)
Urbanization	2.74 (2–4)
SES score	0.008 (−0.730–0.432)

N, number; Ha, hectare; km, kilometer; SES, Social Economical Status.

2.3. Playgrounds Audits

We used the Play Space Audit Tool (PSAT) to assess the playground features [30]. The PSAT is a short and reliable audit tool for assessing playground features, consisting of 48 questions within domains for ‘general amenities’ (e.g., bicycle racks, restrooms, lights, benches), ‘surface’ features (e.g., types, condition, vegetation), ‘path’ features (e.g., wide, smooth, traffic), and ‘play structure’ features (e.g., equipment, loose parts, condition, inclusivity) [23,30]. A detailed description of the PSAT is available elsewhere [30].

Research assistants (N = 8) conducted the playground audits after following training provided by the lead researcher (SB). The training consisted of plenary instructions, manual reading, and field practice. Inter-rater reliability was assessed during field practice on three playgrounds. The preliminary average agreement on the test items was 85% (SD = 18%). Following the 5-step procedures described by Gustat et al. (2024), we removed audit items with lower inter-rater reliability (<75%) [23]. The remaining 31 sample-dependent items, showing an average inter-rater agreement of 90% (SD = 8%) and an interclass correlation coefficient of 0.62, were used to calculate the final domain and overall PSAT scores for each playground.

2.4. Playground Usage

After conducting the playground audits, we evaluated playground usage using a headcount approach, counting the number of children with an estimated age of 0 to 12 years per gender (i.e., boy/girl) within the study area (i.e., playground). Observing the total number of children in play spaces is shown to demonstrate reliable data [31–33]. We conducted observations on Wednesday and Friday afternoons when usage of children was deemed the highest, as most Dutch primary schools have no school or a shortened schedule on these afternoons. By conducting the observation simultaneously in the different neighborhoods, we limited differences in timeframe and weather conditions between the observations. Similar to other methods for observations in public spaces, observations were only conducted with sufficient weather conditions (i.e., dry, ≥ 14 °C) [31].

A map indicating standardized routes through the neighborhoods was provided in the Field Maps app. The research assistants subsequently visited and scanned each playground between 13.00 h and 17.00 h in multiple rounds with approximately 30 min intervals. In total, 461 playground observations were conducted, across 3 of the 6 scheduled afternoons: twice on Wednesday and once on Friday. Observations on the 3 other afternoons were canceled due to weather conditions. The number of observation rounds ranged between 3 and 6 per afternoon and 11 and 14 in total per playground. A total of 426 children were observed, of which 203 were boys (48%) and 223 were girls (52%).

2.5. Data Analysis and Statistics

We combined the audit and headcount data using spatial join procedures in ArcGIS Pro (v3.4.2, ESRI, Redlands, CA, USA). The primary outcome measure was the number of children, in total and per gender, present in the playground. The independent variables were the overall and domain PSAT scores. To analyze the association between the overall and domain PSAT scores and the number of children present in the playgrounds, we used Generalized Estimating Equations (GEE) negative binomial regression models that considered a clustering of the data within two levels: measuring day and playground.

The PSAT scores were included in subsequent models, separately for the overall and domain scores. Model 1 is the unadjusted model. Model 2 was adjusted for a playground variable (i.e., size). Model 3 was adjusted with the same variable as in model 2 plus neighborhood variables, namely size in hectares, number of inhabitants, the proportion of child (0–15 y) inhabitants, population density (inhabitants per square kilometer), urbanization (0–5, with 0 as the lowest and 5 as the highest score based on address density [34]), and a Social Economic Status (SES) score [35], all derived from public data from CBS Statistics Netherlands [34]. The outcomes of these models are expressed by an Incidence Rate Ratio (IRR) and a 95% confidence interval (CI). The quasi-likelihood under independence model criterion was used to compare the performance of the consecutive models. Model 3 performed the best in all cases. In all analyses, an exchangeable working matrix was used. *p*-values and confidence intervals (CIs) were considered to assess the results' significance. All statistical analyses were conducted using IBM SPSS version 29 (SPSS Inc., Chicago, IL, USA).

3. Results

The PSAT overall scores for the playgrounds ($N = 38$) were on average 16.6 ($SD = 3.6$) and varied between 7 and 24 (Table 1). Children were present at the playgrounds in 27.3% of the observations, with an average of 0.92 ($SD = 2.35$) children per playground and numbers ranging from 0 to 30. In seven (18%) playgrounds, we did not observe any children throughout the study, and at eight (25%) playgrounds, we observed children each afternoon.

The results from the analysis of the association between the PSAT scores and playground usage are presented in Table 2. After model adjustments, the 'overall' PSAT score ($IRR = 1.263$, 95% $CI = 1.105$ – 1.443 , $p < 0.001$) and the PSAT scores for the domains 'path' ($IRR = 1.176$, 95% $CI = 1.009$ – 1.371 , $p = 0.038$) and 'play structure' ($IRR = 1.303$, 95% $CI = 1.123$ – 1.512 , $p < 0.001$) were significantly related to playground usage for all the children.

Stratification by gender indicated different associations for boys and girls. For boys, the 'overall' PSAT score ($IRR = 1.186$, 95% $CI = 1.016$ – 1.386 , $p = 0.031$) and the PSAT scores for the domains 'general amenities' ($IRR = 0.676$, 95% $CI = 0.508$ – 0.899 , $p = 0.007$) and 'play structure' ($IRR = 1.288$, 95% $CI = 1.103$ – 1.505 , $p = 0.001$) were significantly related to playground usage.

For girls, the 'overall' PSAT score ($IRR = 1.380$, 95% $CI = 1.189$ – 1.602 , $p < 0.001$) and the PSAT scores for the domains 'path' ($IRR = 1.293$, 95% $CI = 1.109$ – 1.507 , $p = 0.001$) and 'play structure' ($IRR = 1.353$, 95% $CI = 1.130$ – 1.621 , $p = 0.001$) were significantly related to playground usage.

Table 2. Results from the GEE analysis.

PSAT Score	Model 1 ^a (N = 38)			Model 2 ^b (N = 38)			Model 3 ^c (N = 38)		
	IRR	95%CI	<i>p</i>	IRR	95%CI	<i>p</i>	IRR	95%CI	<i>p</i>
Children (N = 426)									
Overall	1.171	1.084–1.266	<0.001 *	1.217	1.066–1.193	<0.001 *	1.263	1.105–1.443	<0.001 *
General amenities	0.791	0.663–0.942	0.009 *	0.816	0.668–0.996	0.046 *	0.785	0.611–1.009	0.059
Surface	2.607	1.156–5.878	0.021 *	1.873	0.793–4.424	0.152	1.671	0.704–3.965	0.244
Path	1.115	0.965–1.289	0.139	1.160	1.018–1.322	0.026 *	1.176	1.009–1.371	0.038 *
Play structure	1.252	1.061–1.477	0.008 *	1.156	1.023–1.306	0.020 *	1.303	1.123–1.512	<0.001 *
Boys (N = 203)									
Overall	1.121	1.020–1.232	0.018 *	1.082	1.010–1.159	0.025 *	1.186	1.016–1.386	0.031 *
General amenities	0.704	0.571–0.867	<0.001 *	0.718	0.546–0.944	0.018 *	0.676	0.508–0.899	0.007 *
Surface	5.365	1.703–16.903	0.004 *	3.274	1.032–10.390	0.044 *	2.633	0.822–8.438	0.103
Path	1.011	0.864–1.184	0.888	1.072	0.933–1.231	0.328	1.092	0.916–1.301	0.326
Play structure	1.263	1.030–1.549	0.025 *	1.156	1.014–1.319	0.031 *	1.288	1.103–1.505	0.001 *
Girls (N = 223)									
Overall	1.203	1.127–1.285	<0.001 *	1.164	1.096–1.235	<0.001 *	1.380	1.189–1.602	<0.001 *
General amenities	0.896	0.743–1.080	0.249	0.899	0.730–1.106	0.315	0.902	0.668–1.218	0.501
Surface	1.791	0.729–4.403	0.204	1.380	0.531–3.587	0.509	1.345	0.501–3.611	0.556
Path	1.217	1.039–1.426	0.015 *	1.249	1.066–1.464	0.006 *	1.293	1.109–1.507	0.001 *
Play structure	1.251	1.078–1.450	0.003 *	1.171	1.031–1.330	0.015 *	1.353	1.130–1.621	0.001 *

PSAT, Play Space Audit Tool; IRR, Incidence Rate Ratio; CI, confidence interval. ^a Unadjusted model. ^b Model adjusted for playground variable: size. ^c Model adjusted for the playground variable and neighborhood variables: size, number of inhabitants, proportion of child inhabitants, inhabitant density, urbanization, and SES. * Significant at $p < 0.05$.

4. Discussion

In this study, we sought to evaluate the association between playground features and children's playground usage, also considering gender. Thus far, most studies that focus on playground usage have focused on parks [19,22,33,36] or schoolyards [24,37] instead of public neighborhood playgrounds, or evaluated a specific playground feature instead of applying a total playground audit [16,20,21,24,25,38]. Hence, this is one of the few studies evaluating the association between public playground features and the playground's utilization.

Our main finding is that a 1-point increase in the 'overall' and 'play structure' PSAT scores was associated with an increase in the number of children on the playgrounds of, respectively, 26% and 30%. This means that playground features were related to children's playground usage, as we hypothesized. This also means that the presence and quality of play structures, such as swings, climbing apparatus, and loose parts like balls, planks, and ropes, attract more children. Similar results are consistently found in the literature [17,23,24,37]. Our study adds that this relationship may be stronger in girls, as a 1-point increase in the PSAT domain score for 'play structure' was associated with an increase of 29% and 35% in boys and girls, respectively.

Gender differences in play behavior in children have been well established in the literature, indicating that boys, compared to girls, use playgrounds more and engage in more moderate to vigorous physical activity at playgrounds [12,18,20,34–36]. Interestingly, in our study, we found that girls and boys were equally present in the outdoor playgrounds. The fact that our study was conducted in the neighborhood playground, close to children's

homes, may have contributed to equal playground use between boys and girls. Previous studies have shown that parents are more likely to restrict unsupervised outdoor play in girls and that parents hold lower expectations of girls' self-efficacy in managing injury-risking play situations [26].

Our study also found that, for boys specifically, a higher PSAT domain score for 'general amenities', such as bicycle racks, restrooms, lights, and benches, was related to lower playground usage by boys. An explanation for this finding may be that some boys seek out playgrounds that offer opportunities for game-like and sports activities [20,38] and, therefore, they may prefer playing at playgrounds with open spaces or black-tops [12] and fewer amenities. In that case, general amenities may be unnecessary for their play activity or may even stand in their way.

For girls specifically, we found that a higher score for paths, such as wide, smooth, and looped paths in the playground, was related to higher playground usage by girls. A possible explanation is that some girls are likely to engage in more static and sedentary play [26], which may be better facilitated in playgrounds that offer smaller, distinct play places. Pathways may provide the needed separation of the play space into smaller play places, where room can be found for more sedentary play.

Limitations and Strengths

Although this study provided valuable insights, several limitations of this study should be considered when interpreting the results. The PSAT has been demonstrated to provide a valuable and reliable assessment of playground features [21,26], but the short and user-friendly format limits the number of items in the tool. As such, the PSAT may have overlooked important playground features, increasing the risk for type 2 errors. Secondly, the PSAT procedures provide sample-dependent scores, which may improve the reliability and validity of the measurements but also limit the generalizability of the results. Thirdly, because we collected the data on Wednesday and Friday afternoons when playground usage was deemed high, the results from this study are limited to those timeframes. We are unsure how the results translate to other timeframes during the week, including the weekend. Finally, no conclusions can be made about the causality between playground features and playground usage, because of the cross-sectional design of this study.

A strength of this study was that we used a simple and reliable audit tool, and trained research assistants to conduct the observations. Also, following the PSAT scoring system and conducting the observations on the playgrounds simultaneously strengthened the comparison between the playgrounds. Another important quality of our study is that it included all children in the playground, regardless of their physical activity (PA) level. This approach allowed us to capture the full scope of children's regular playground utilization, acknowledging that a significant proportion of play behavior is inactive [12]. Future studies may focus on not only accommodating gender-specific play preferences but also enhancing gender equity in children's play opportunities.

5. Conclusions

The playgrounds' overall and play structure features were robustly associated with playground utilization. The results indicated that a 1-point increase in the 'overall' and 'play structure' PSAT scores was associated with an increase in the number of children on the playgrounds of, respectively, 26% and 30%, and that the associations varied for boys and girls. The associations were the strongest for girls. Additionally, the domain scores for the presence of general amenities in the playground appeared to be negatively associated with playground utilization for boys, and the domain scores for the paths in the playground were positively associated with playground utilization for girls. Our findings

enforce the role of play structure quality and gender in the interplay between playground design and utilization. The findings also support the instrumental validity of the PSAT based on actual use of playgrounds. Hence, professionals can use the PSAT audit tool to identify opportunities for enhancing their playgrounds to accommodate and attract more children to play there.

Author Contributions: Conceptualization, S.B.; methodology, S.B.; formal analysis, S.B.; writing—original draft, S.B.; writing—review and editing, S.B., E.P. and D.E.; data curation; S.A. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of Aeres University of Applied Sciences (#AeresUAS-2024-12-01).

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Acknowledgments: We would like to thank research assistants Marie Aghajanyan, Tara Ali Pour Emmami, Fleur Broekhof, Nurliyana Lerrick, Celine van der Linde, Luuk Nieswand, Isa-Marie Wateler, and Myrre Zwanikken for their contribution to this study.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. United Nations. *Convention on the Rights of the Child*; United Nations: New York, NY, USA, 1989.
2. Ekelund, U.; Tarp, J.; Steene-Johannessen, J.; Hansen, B.H.; Jefferis, B.; Fagerland, M.W.; Whincup, P.; Diaz, K.M.; Hooker, S.P.; Chernofsky, A.; et al. Dose-response associations between accelerometry measured physical activity and sedentary time and all cause mortality: Systematic review and harmonised meta-analysis. *BMJ* **2019**, *366*, l4570. [[CrossRef](#)] [[PubMed](#)]
3. World Health Organization. *Global Action Plan on Physical Activity 2018–2030: More Active People for a Healthier World*; World Health Organization: Geneva, Switzerland, 2019.
4. Schipperijn, J.; Madsen, C.D.; Toftager, M.; Johansen, D.N.; Lousen, I.; Amholt, T.T.; Pawlowski, C.S. The role of playgrounds in promoting children's health—A scoping review. *Int. J. Behav. Nutr. Phys. Act.* **2024**, *21*, 72. [[CrossRef](#)] [[PubMed](#)]
5. Biddle, S.J.H.; Asare, M. Physical activity and mental health in children and adolescents: A review of reviews. *Br. J. Sports Med.* **2011**, *45*, 886–895. [[CrossRef](#)] [[PubMed](#)]
6. Janssen, I.; LeBlanc, A.G. Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *Int. J. Behav. Nutr. Phys. Act.* **2010**, *7*, 40. [[CrossRef](#)]
7. VPereira, J.; Vila-Nova, F.; Veiga, G.; Lopes, F.; Cordovil, R. Associations between outdoor play features and children's behavior and health: A systematic review. *Health Place* **2024**, *87*, 103235. [[CrossRef](#)]
8. Lee, E.-Y.; Bains, A.; Hunter, S.; Ament, A.; Brazo-Sayavera, J.; Carson, V.; Hakimi, S.; Huang, W.Y.; Janssen, I.; Lee, M.; et al. Systematic review of the correlates of outdoor play and time among children aged 3–12 years. *Int. J. Behav. Nutr. Phys. Act.* **2021**, *18*, 41. [[CrossRef](#)]
9. Sallis, J.F.; Bull, F.; Burdett, R.; Frank, L.D.; Griffiths, P.; Giles-Corti, B.; Stevenson, M. Use of science to guide city planning policy and practice: How to achieve healthy and sustainable future cities. *Lancet* **2016**, *388*, 2936–2947. [[CrossRef](#)]
10. Tremblay, M.; Gray, C.; Babcock, S.; Barnes, J.; Bradstreet, C.C.; Carr, D.; Chabot, G.; Choquette, L.; Chorney, D.; Collyer, C.; et al. Position Statement on Active Outdoor Play. *Int. J. Environ. Res. Public Health* **2015**, *12*, 6475–6505. [[CrossRef](#)]
11. Sallis, J.F.; Cervero, R.B.; Ascher, W.; Henderson, K.A.; Kraft, M.K.; Kerr, J. An ecological approach to creating active living communities. *Annu. Rev. Public Health* **2006**, *27*, 297–322. [[CrossRef](#)]
12. Helleman, G.; Nio, I.; De Vries, S.I. Playing outdoors: What do children do, where and with whom? *J. Child. Educ. Soc.* **2023**, *4*, 322–337. [[CrossRef](#)]
13. Lerstrup, I.; Konijnendijk van den Bosch, C. Affordances of outdoor settings for children in preschool: Revisiting heft's functional taxonomy. *Landsc. Res.* **2017**, *42*, 47–62. [[CrossRef](#)]

14. Cohen, D.A.; Talarowski, M.; Han, B.; Williamson, S.; Galfond, E.; Young, D.R.; Eng, S.; McKenzie, T.L. Playground Design: Contribution to Duration of Stay and Implications for Physical Activity. *Int. J. Environ. Res. Public Health* **2023**, *20*, 4661. [CrossRef] [PubMed]
15. Remmers, T.; Thijs, C.; Ettema, D.; De Vries, S.; Slingerland, M.; Kremers, S. Critical Hours and Important Environments: Relationships between Afterschool Physical Activity and the Physical Environment Using GPS, GIS and Accelerometers in 10–12-Year-Old Children. *Int. J. Environ. Res. Public Health* **2019**, *16*, 3116. [CrossRef]
16. Sumiya, M.; Nonaka, T. Does the Spatial Layout of a Playground Affect the Play Activities in Young Children? A Pilot Study. *Front. Psychol.* **2021**, *12*, 627052. [CrossRef]
17. Reimers, A.K.; Knapp, G. Playground usage and physical activity levels of children based on playground spatial features. *J. Public Health* **2017**, *25*, 661–669. [CrossRef]
18. Morgenthaler, T.; Schulze, C.; Pentland, D.; Lynch, H. Environmental Qualities That Enhance Outdoor Play in Community Playgrounds from the Perspective of Children with and without Disabilities: A Scoping Review. *Int. J. Environ. Res. Public Health* **2023**, *20*, 1763. [CrossRef]
19. Cohen, D.A.; Talarowski, M.R.; Han, B.; Williamson, S.L.; Galfond, E.C.; Young, D.R.; Eng, S.; McKenzie, T.L. Playground Design and Physical Activity. *Am. J. Prev. Med.* **2023**, *64*, 326–333. [CrossRef]
20. Boonzajer Flaes, S.A.M.; Chinapaw, M.J.M.; Koolhaas, C.M.; van Mechelen, W.; Verhagen, E.A. More children more active: Tailored playgrounds positively affect physical activity levels amongst youth. *J. Sci. Med. Sport* **2016**, *19*, 250–254. [CrossRef]
21. Talarowski, M.; Cohen, D.A.; Williamson, S.; Han, B. Innovative playgrounds: Use, physical activity, and implications for health. *Public Health* **2019**, *174*, 102–109. [CrossRef]
22. Cohen, D.A.; Han, B.; Williamson, S.; Nagel, C.; McKenzie, T.L.; Evenson, K.R.; Harnik, P. Playground features and physical activity in U.S. neighborhood parks. *Prev. Med.* **2020**, *131*, 105945. [CrossRef]
23. Gustat, J.; Anderson, C.E.; Slater, S.J. Association of Playground “Playability” With Physical Activity and Energy Expenditure. *Prev. Chronic Dis.* **2023**, *20*, 220247. [CrossRef]
24. Colabianchi, N.; Maslow, A.L.; Swayampakala, K. Features and amenities of school playgrounds: A direct observation study of utilization and physical activity levels outside of school time. *Int. J. Behav. Nutr. Phys. Act.* **2011**, *8*, 32. [CrossRef] [PubMed]
25. Dymont, J.; O’Connell, T.S. The impact of playground design on play choices and behaviors of pre-school children. *Child. Geogr.* **2013**, *11*, 263–280. [CrossRef]
26. Boxberger, K.; Reimers, A.K. Parental Correlates of Outdoor Play in Boys and Girls Aged 0 to 12—A Systematic Review. *Int. J. Environ. Res. Public Health* **2019**, *16*, 190. [CrossRef] [PubMed]
27. Reimers, A.K.; Schoeppe, S.; Demetriou, Y.; Knapp, G. Physical Activity and Outdoor Play of Children in Public Playgrounds—Do Gender and Social Environment Matter? *Int. J. Environ. Res. Public Health* **2018**, *15*, 1356. [CrossRef]
28. Meng, X.; Wang, M. Comparative Review of Environmental Audit Tools for Public Open Spaces from the Perspective of Children’s Activity. *Int. J. Environ. Res. Public Health* **2022**, *19*, 13514. [CrossRef]
29. Cohen, D.A.; Setodji, C.; Evenson, K.R.; Ward, P.; Lapham, S.; Hillier, A.; McKenzie, T.L. How Much Observation Is Enough? Refining the Administration of SOPARC. *J. Phys. Act. Health* **2011**, *8*, 1117–1123. [CrossRef]
30. Gustat, J.; Anderson, C.E.; Slater, S.J. Development and Testing of a Brief Play Space Audit Tool. *J. Phys. Act. Health* **2020**, *17*, 13–20. [CrossRef]
31. McKenzie, T.L.; Cohen, D.A.; Sehgal, A.; Williamson, S.; Golinelli, D. System for Observing Play and Recreation in Communities (SOPARC): Reliability and Feasibility Measures. *J. Phys. Act. Health* **2006**, *3*, S208–S222. [CrossRef]
32. Marquet, O.; Hipp, J.A.; Alberico, C.; Huang, J.-H.; Fry, D.; Mazak, E.; Lovasi, G.S.; Floyd, M.F. Use of SOPARC to assess physical activity in parks: Do race/ethnicity, contextual conditions, and settings of the target area, affect reliability? *BMC Public Health* **2019**, *19*, 1730. [CrossRef]
33. Evenson, K.R.; Jones, S.A.; Holliday, K.M.; Cohen, D.A.; McKenzie, T.L. Park characteristics, use, and physical activity: A review of studies using SOPARC (System for Observing Play and Recreation in Communities). *Prev. Med.* **2016**, *86*, 153–166. [CrossRef] [PubMed]
34. Centraal Bureau voor de Statistiek. Kerncijfers Wijken en Buurten 2024. 2024. Available online: <https://www.cbs.nl/nl-nl/cijfers/detail/85984NED> (accessed on 22 November 2024).
35. Centraal Bureau voor de Statistiek. Hoe Interpreter je de SES-WOA-Scores en hoe zijn Deze Bepaald? 2024. Available online: <https://www.cbs.nl/nl-nl/faq/infoservice/hoe-interpreteer-je-de-ses-woa-scores-en-hoe-zijn-deze-bepaald-> (accessed on 22 November 2024).
36. Cohen, D.A.; Marsh, T.; Williamson, S.; Derose, K.P.; Martinez, H.; Setodji, C.; McKenzie, T.L. Parks and physical activity: Why are some parks used more than others? *Prev. Med.* **2010**, *50*, S9–S12. [CrossRef] [PubMed]

-
37. Anthamatten, P.; Fiene, E.; Kutchman, E.; Mainar, M.; Brink, L.; Browning, R.; Nigg, C.R. A Microgeographic Analysis of Physical Activity Behavior within Elementary School Grounds. *Am. J. Health Promot.* **2014**, *28*, 403–412. [[CrossRef](#)] [[PubMed](#)]
 38. Blikendaal, S.; Nauta, J. Promoting public playgrounds usage and children's physical activity with sports activities: A quasi-experimental study. *Health Place* **2024**, *87*, 103248. [[CrossRef](#)]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.