

Review

Child-Friendly Environments—What, How and by Whom?

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Abstract: The socio-physical qualities of built environments are, in several ways, of imperative importance for children growing up. The Child-Friendly Cities initiative by UNICEF, an implementation of the UN Convention on the Rights of the Child, has made local governments strive toward child-friendliness. The participation of children and young people is often the focus of such projects, with a potential for a far broader scope. Besides participation processes, what important socio-physical qualities make environments child-friendly, and how can they be developed? This paper presents a structured literature review of the concept of child-friendly environments, in order to address the full socio-physical spectrum. The results focus on concrete factors that have been filtered through child-friendliness and the associated frameworks, showing an inherent dependence between the social context and the physical environment. The shaping of child-friendliness hinges on the realization of environments that are safe, fair, and with accessible and variable green and open spaces. A multi-stakeholder endeavor including, e.g., planners, designers, and managers requires clearly outlined priorities. This study lays the groundwork for further exploration of how the concept of child-friendly environments can lead to positive changes, also as part of the overall strive toward sustainable development.



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1. Introduction

What are child-friendly environments (CFE)? The concept has been explored for at least the past 50 years. The importance of outdoor environments to the quality of children's lives emerged with the architects and radical thinkers of the 1970s, as increasing numbers of children were raised in cities [1–3]. The most influential policy on the topic—the United Nations Convention on the Rights of the Child (UNCRC)—surfaced in 1989, promoting the three (or four) “Ps”: protection, provision, and participation (and prevention) [4], which are universal components for childhood in any society, whether urban or not. The focus was particularly on how local policy and governance could include children and their perspectives through, e.g., participatory approaches and methods. Riggio [5] (p. 57) described children's participation as a global goal that “runs through the multiple child-friendly models, weaving different experiences”. This focus on participation was an important milestone in including children's voices in the development of urban environments [6]. However, it has also been overshadowing other aspects and has left the holistic picture of CFE somewhat unexplored, including its important connection to and role in the sustainable development of urban environments [7,8].

The discussion on child welfare, well-being, and quality of life reached another milestone in 1996, when the “Child-Friendly Cities Initiative” (CFCI) was introduced after the UN conference Habitat II by UNICEF and UN-Habitat [9]. The CFCI was an implementation of international agreements, mainly based on local applications of the UNCRC

(emphasizing articles 2, 3, 6, and 12), which laid the foundation for an approach to CFE. This initiative was particularly focused on child-friendly cities as “a system of governance committed to fulfilling the rights of children” [5] (p. 47), and led to a diverse global network of local governments, committed to the improvement of the urban lives of children [10]. Specifically, the CFCI was defined according to nine requirements for a child-friendly city (Table 1), to be interpreted and incorporated into different social and physical environments. The breadth of this framework has also allowed a more recent relationship to be made with the targets of the UN sustainable development goal (SDG) number 11 for sustainable cities and communities, which overlap with the nine requirements for a child-friendly city.

Table 1. The definition of a child-friendly city, based on the CFCI framework [11].

A Child-Friendly City Is Where Children:	
1	are protected from exploitation, violence, and abuse.
2	have a good start in life and grow up healthy and cared for.
3	have access to quality social services.
4	experience quality, inclusive, and participatory education and skills development.
5	express their opinions and influence decisions that affect them.
6	participate in family, cultural, city/community, and social life.
7	live in a safe secure and clean environment, with access to green spaces.
8	meet friends and have places to play and enjoy themselves.
9	have a fair chance in life, regardless of their ethnic origin, religion, income, gender, or ability.

The discourse on children’s rights led to a wave of interdisciplinary studies, many of which have aligned their perspective with the foci on children’s participation as a way of improving local environments for children, highlighting the importance of participatory methods [12–15]. Despite leaving the discussion on the qualities of environments largely undeveloped, a number of additional social and physical conditions that affect childhood have surfaced [16,17]. The range of factors includes, e.g., independent mobility as negotiated between parents and children [18,19], children’s agency and their sense of community [20], and understanding adult presence (both professional and private) [7,21]. Several physical qualities have also been suggested as fundamental for CFE, such as varying and complex green spaces [22], low levels of car traffic [23], and a moderate urban density [17], indicating a need for an inclusive perspective that can situate both the physical and social qualities of the environment.

Besides the term “child-friendly cities” (CFC, based on the CFCI), there are a number of concepts of child-friendliness that can be comprehensively utilized [16,24,25], besides CFE [16,21,24], there are also, for example, “child-friendly spaces” [26] and “child-friendly communities” [27]. A common feature that permeates the spatial concepts, in contrast to the UNCRC, is their dependence on context [17]; certain studies, for example, indicate that interpretation and/or implementation of CFE differ across geographical areas [7,28]. The study of CFE then requires a vocabulary fit for contextualizing the physical dimensions at different scales and in varying geographical locations.

The separation of focus between social and physical factors might be bridged through the concept of actualized affordances [29] as a manifestation of an individual’s relationship with environmental features, enabling the opportunity for action. Affordances have been defined as part of the overarching criteria in the creation of CFE [16], and the relationship formed between child and place has, from a combined socio-physical perspective, been compared to a reciprocal relationship—known as place friendship [26]. The social aspects are quite inseparable from the physical setting where the transactions between the child and the socio-physical environment take place [30]. Han and Kim [8], therefore, have requested an increased focus on the emotional experiences of children for a holistic perspective on

the development of CFE. In order to help provide a congruent child–place relationship for the less powerful voices of children, professionals of the built environment require a well-defined socio-physical domain.

Changes in the socio-physical qualities of an environment are formed by constant activities, which in turn are affecting people’s relationships with their environment [31]. Hence, people interact with the socio-physical environment as actors, including children, parents, professionals, etc., who either directly engage in, or indirectly inspire, the further activities of other actors [16]. To enhance the dialog between child and place, to “provide children with a sufficient quality of life, planners, architects, and designers should consider the socio-physical environment in direct relationship to children’s perspectives, experiences, and transactions” [30] (p. 76). The academic literature generally aims at further developing the spatial concept of CFC [32–35], not only by putting the children in a dialogue with policymakers but also by focusing on the professionals of the built environment. For example, Horelli [21] proposed a “theoretical framework for environmental child-friendliness”, including “settings and environmental structures that provide support to individual children and groups that take an interest in children’s issues, so that children can construct and implement their goals or projects” [21] (p. 283). The concept of CFE and the associated body of literature might thus allow identifying both actors and activities along with those socio-physical qualities that are of importance.

There is a need for understanding the various aspects of the holistic concept of CFE and how it has developed, including its connection to the sustainable development of urban environments [7,8]. While the scientific knowledge on CFE has grown over the years, the socio-physical qualities identified have not been compiled, overshadowed by the focus on participation. When we now take stock of the research literature, children’s participation is of great importance, but it is also about the qualities of the actual environments, with their social and physical conditions for children [16,17]. The study of CFE requires contextualizing the socio-physical dimensions at different scales and geographical locations, in order to create a baseline for more knowledge production.

The aim of this study is to analyze and synthesize the concept of child-friendly environments and its use within the research literature, in order to reach a more in-depth understanding of the socio-physical qualities and actors supporting its realization. The study is based on the following research questions:

1. In what contexts have CFE been studied up to the year 2020?
2. What actors and activities are involved in CFE?
3. What factors are strong indicators for CFE?
4. What socio-physical factors have been found to be important for realizing CFE?

2. Methods

This study is based on a structured literature review of scientific papers about CFE. Literature searches were conducted on multiple occasions, following four stages: search, screen, selection, inclusion, and analysis (Figure 1). At each stage, the data were restructured and assessed according to chosen variables and delimitations.

Scope: To capture the intended scope of the subject, scientific papers were gathered through searches in Scopus, combined with the journal *Children, Youth and Environments* at JSTOR, (a peer-reviewed journal not indexed on Scopus, but central for the subject as the main forum for the literature on CFE). Since the search engines of Scopus and JSTOR have different filters for searching, they each required adapted approaches. Considering the need to capture the varying terms used in connection to child-friendly environments, the selected search term was “child-friendly”, allowing the differing associated spatial specifications to be included. When possible, the search was set to include all results with the search term in the title, keywords, or abstract; where this filter was not available, this limitation was done manually as part of the screening process. The search was also limited to papers and reviews (excluding, for example, book chapters and conference papers), written in English.

Screen: After the search, all results with the search term “child-friendly” in the title, keywords, or abstract were limited further by a read-through, where the screening criteria were focused on CFE. This included noting the overarching variables relating to CFE used in each paper, particularly the central concepts, subject areas and perspectives, activities, and directly mentioned or indirectly highlighted indicators. At the end of the screening, studies with none or very little information centered on CFE were, hence, excluded.

Select: The studies with sufficient overarching information relating to CFE that had been deemed relevant from the screening process were gathered. In order to capture the papers with socio-physical approaches to the subject, additional content-based delimitations were added to the selection process. This step meant excluding papers not giving, either empirically or theoretically, input based on what CFE are or could be from a physical or socio-physical perspective. This excluded papers not presenting research, or focusing on policy, institutional settings such as schools, prisons, or hospitals, on children with special needs, in severe poverty or disaster areas (often mentioned as child-friendly spaces or supportive environments for children in a humanitarian crisis) or about the methodological development of children’s participation rather than the socio-physical environmental aspects.

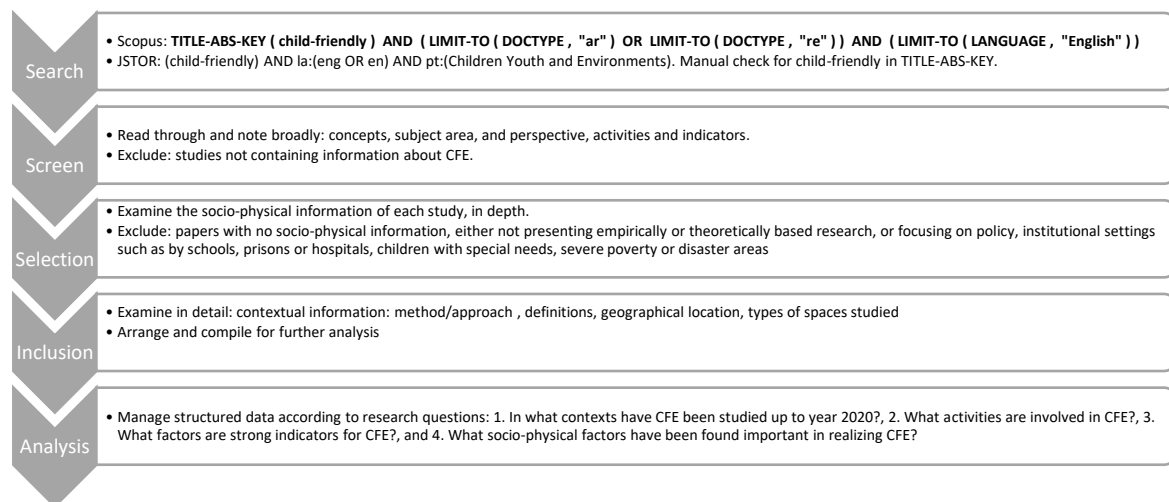


Figure 1. The five stages of the methodological process.

Structure: The studies that remained after the screening and selection phases were deemed relevant and included for further compilation. Based on the indicators for CFE noted during the screening process, all the socio-physical information and details were gathered and structured so that common themes could be identified. Contextual information was extrapolated and added to the notes from the screening process.

Analysis: The structured data from the included studies were analyzed and interpreted, based on the four overarching research questions:

1. Context—to contextualize the socio-physical factors and changes of CFE over time, the context was analyzed with regard to (i) geographical location, to understand variation in cultural context; (ii) scale, to situate the socio-physical information in a way that could convey the breadth of gathered data concerning the physical environment; and (iii) the theoretical frameworks and academic definitions of CFE.
2. Actors and activities—to understand the activities that impact CFE, activities were assessed based on each individual study’s area of focus. If a study focused on/analyzed/discussed, e.g., both planning and participation as drivers for change, then both were listed as activities for that particular study. Then, a percentage based on the total number of studies was calculated to compare the commonality of different activities.

3. Indicators—to identify the indicators for CFE from those studies, where possible, the core factors were drawn out as an extension of the screening process. Such indicators were those instances where attention was focused on specific socio-physical characteristics.
4. Socio-physical factors—the gathered data on socio-physical factors of CFE was noted from the results and discussions of each paper. The analysis assumes a socio-physical link between factors but separates, where possible, the social factors from the physical factors. If the position along the socio-physical spectrum was too broad to place as either physical or social, it was listed as a socio-physical factor. In the case of social factors, particular attention was paid to the factors with clear links to the physical environment. The themes for social and physical factors were informed largely by the activities and indicators previously discovered.

3. Results

The results are based on the final 88 papers from the time span 1998 to 2020. For a list of all included papers, see Appendix A.

3.1. The Context of Child-Friendly Environment Studies

From its first mention in 1998 until 2020, there has been an increasing number of peer-reviewed papers that have been dedicated specifically to the study of CFE; this includes specifying terms, such as child-friendly cities, spaces, communities, urban environments, neighborhoods, play spaces, integrated public spaces, routes, planning, tourism environments and high-density environments/neighborhoods. Correspondingly, the vast majority of studied examples were public spaces at either the city, neighborhood, or community scale (Figure 2), while very few tackle the wider lens of a country or continent or a global perspective. Most studies focus on a particular type of space (playgrounds, heritage sites, transitory zones, public spaces, etc.), and use one of the original frameworks to build upon. Over half of the studies directly mention the “Child-friendly Cities Initiative” (UNICEF) as a framework, with some additions going back to the original vision statement in the UNCRC [36]. The others reference the same source material framing child-friendliness: Kytta [16] (affordance theory), Kretz [30] (transactional theory), and Horelli [21] (child-friendly environments), demonstrating how the various child-friendly terms have been developed in a similar theoretical context and can often be used interchangeably.

SCALE OF CHILD-FRIENDLY ENVIRONMENTS

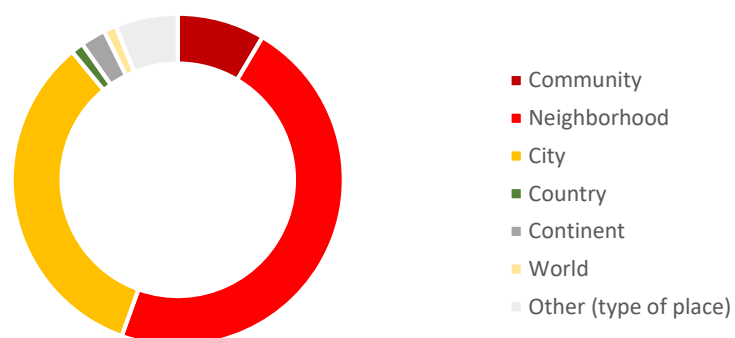


Figure 2. The scale of studied child-friendly environments.

Although the studied examples of CFE have a common conceptual framework, each study expresses a unique perspective. Most studies performed in the earliest stages of development of the concept stem from communities in European countries (with significant representation, particularly from Finland). Although the last decade has seen an increasing variation in this respect, with increases in CFE studies from communities in Oceanic and Asian countries (Figure 3), there are still notable absences from South American countries.

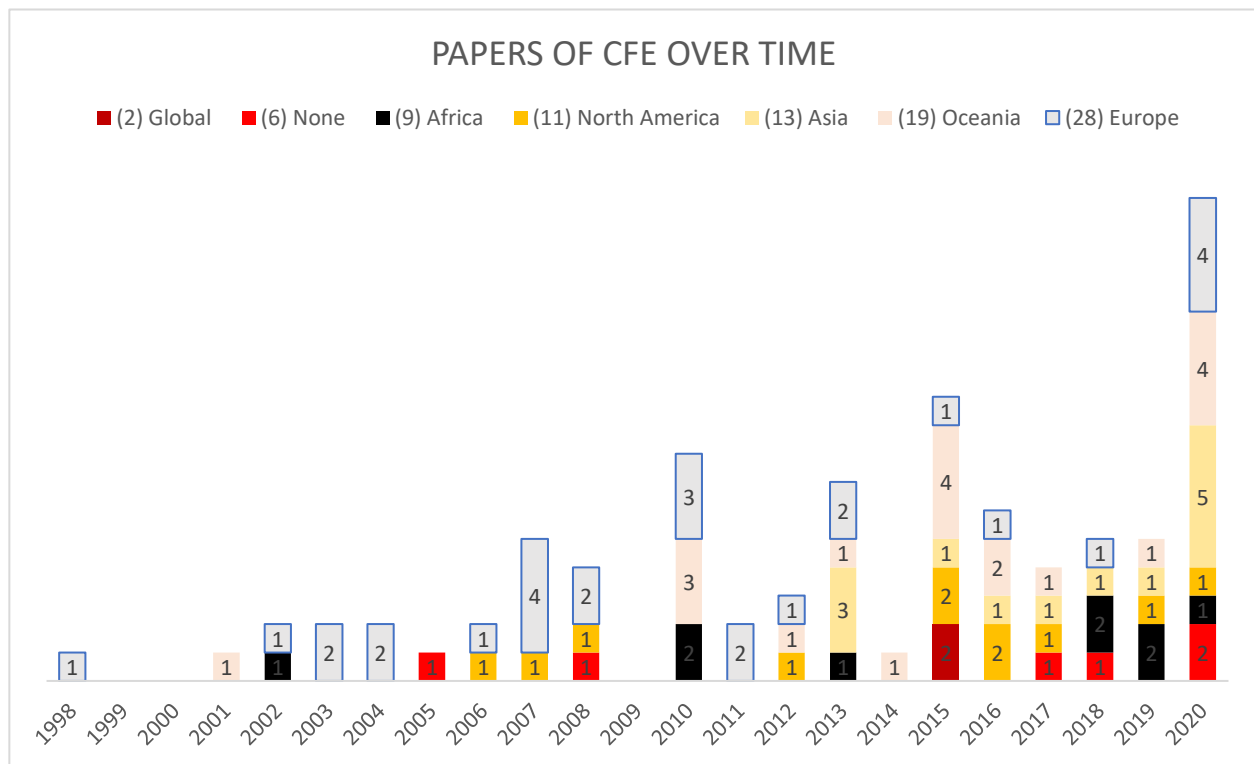


Figure 3. The reviewed papers, arranged according to publishing year and continent.

Many of the studied definitions of child-friendliness embroider the foundational CFCI-framework in specificity, predominantly to describe social or geospatial settings. The additive contributions include, for example, *Bullerby* [16], *care-full cities* [37], *play island* [38], *Kids-PoND* (perceptions of neighborhood destinations) [39], or *child-friendly integrated public spaces* [40], which are academic concepts highlighting specific aspects in a particular study. In contrast, examples such as *Tamariki Tu, Tamariki Ora* (roughly translated as “standing children, living children”) [41], *City of Culture UK* [42], and *Ruang Publik Terpadu Pamah Anak* (RPTRA), highlight specific concepts or interventions for CFE in a specific socio-physical and cultural context.

CFE, as an interdisciplinary topic, has seen overall input from social sciences, specifically perspectives that combine a psycho-social perspective, gaging children’s perspectives, with an urban development perspective, analyzed through a grown-up’s lens. The scope often spans from individual to community and from convention (UNCRC) to local policy. This is executed predominantly through studies that cover a broad range of methods, from reviews, interviews, surveys, and case studies to children’s drawings and games, and are indicative of the breadth of methods used for those studies predominantly covering children’s perspectives of CFE. The age groups studied vary from preschoolers to teenagers, and some approaches are more commonly used for certain age groups. Drawings and games are more likely to be used for younger children [28,37], while surveys and reviews are used for older children (or adults) [42,43]. Overall, there is a strong tendency toward multi-method studies that cover more than one perspective, such as both the child’s and the parent’s or caregiver’s perspective [44].

3.2. Actors and Activities Affecting Child-Friendly Environments

The studies often discuss actors and specific activities required for the sustaining or realization/development of CFE. These are either referred to as drivers of change in these environments or are implicitly discussed as such. The studied perspectives belong to children, parents, and grownups in professional capacities. The respective activities that they engage in are primarily *participation* (58%), *regulation* (45%), *planning* (66%),

design (32%), and *management* (26%) of the built environment. Other activities described include *research* (16%), *collaboration* (13%), and *education* (10%). The average number of activities mentioned in a study was 3 (2,81). Many of the included professional actors are, to some degree, interdisciplinary and perform activities that can lead to broad socio-physical change. The wide range of actors includes urban planners, designers and managers, politicians/policymakers, stewards/trustees, and children.

3.3. Socio-Physical Indicators

In the studied papers, the social and physical factors of realizing child-friendly environments are either listed separately or are expressly linked. From this plethora of factors, the core values of the concept can be drawn out as indicators for CFE across the socio-physical spectrum. These core factors can be seen as having a definitive importance for CFE, and were independently elevated in individual papers, including: *access to green space and local environment* [7,43,45–48], prerequisites for *independent mobility* [16,35,49–51], the opportunity to *actualize affordances* [17,40,52–55], *children's participation* [33,56–58], *inclusive environments* [26,59,60], and *safety* [45,61–65]. On some occasions, papers list the initial frameworks as indicators, such as the *UNCRC three Ps* [66,67] and an integration of *CFCI perspectives* [68]. Some of the other indicators include: *a clean environment* [48,54,69], and *proximity/walkability* [43,46,48,70]. Some also mention a combination of several factors [62], most notably Kytta [16], with the combination of actualized affordances and independent mobility. These indicators likely also hint at the full breadth of socio-physical factors that are discussed across all examined studies and that served as a starting point for the more detailed analysis and categorizing of several socio-physical factors.

3.4. Socio-Physical Factors

The many socio-physical factors identified were grouped into ten themes, which are expressly linked, creating a connection and overlap between the social and physical perspectives, or between the person and the place. This concept was expressed in different ways, for example, in the creation of *social spaces*, *socio-material structures*, and *socio-nature* [37,71]. The overlap is also visible in a number of factors spread out over different themes, demonstrating that they are not mutually exclusive. Such examples include *actualized affordances* [16], *place-attachment* [26], and *environment determinism of human social behavior* [72], conditioning a factor to both physical and social environment. In other cases, the link was implicit and was only apparent when viewed in the context of other themes.

3.5. Green and Open Spaces

The most commonly addressed theme was green and open spaces, which detail the types of environments and qualities of environments that are deemed child-friendly. Green and open spaces cover a broad range of factors for CFE and are addressed in 85% of the studied papers.

Green spaces is the most commonly mentioned factor for CFE [27,33,48,51,56,73]. The most consistent factors that center the theme around green spaces are *nature* [24,25,44,47,52,54,61,69,74], *wilderness* [45,54], *biodiversity* [74,75], *vegetation* [43,46,47,54,68,76] and *urban nature* [33]. These environments can include *green elements* [43], *water* [47,74,77], *animals* [54,69,76,78,79], *shrubs* [46,75], and *trees* [68,69], including *climbing trees* [44,46], and that can create particular kinds of places, such as *hiding places* [30,44,46,52,75] and *secret places* [26,34,55,80].

Among the spaces that often overlap with greenery, the most common types are *playgrounds* [22,43,44,48] and different *parks* [51,54,61,78,79,81]. These are common *designated spaces* [51,62,69,72] and offer important *play spaces* for children [45,50,82].

The broader range of environments includes *underused or derelict spaces* [22,45], such as alleyways, vacant lots, and wasteland, and also extends to *public facilities* [61,63,79] such as pools, museums, and community centers, as well as (typically) *private spaces around homes* [43,46]. It also extends to the *streets* [45,79,83,84], functioning both as connections and as play environments in themselves [51]. In addition, older children or youths require

social spaces for after-school leisure, in areas such as *commercial spaces* where they can hang out together (rather than play) [13,14,22,51].

For CFE to be better for several age groups requires an often-mentioned *variety* [33,45,53,59,64,85], which extends to different types of child-friendly spaces. Moreover, the requested qualities in green spaces often include *variation* as a quality in its own right [33,46,53]. This can be seen in qualities from a mixture of *open and closed spaces* [46], cover both *highly designed and maintained playgrounds* with smooth slopes and surfaces [52] and *age-appropriate size and design* [62,64,69,81], adapted to all *variations of ability* [44,72], to *informal and unprogrammed areas* [24,45,59,60] that are *green, natural or wild* [13,14,45,50]. The qualities needed in different types of spaces may also depend on the context; while some studies advocate for the elimination of *architectural barriers* more generally [53,56], others frame a selective reduction or application around specific types of spaces [27,44] where, for example, entry gates and fences can be used as a feature for controlling access (as connected to theme of access) [28].

Overall, there is a desired breadth that goes beyond strict land zoning [59]. This should allow the blurring of edges to spaces such as playgrounds [38], while also providing *integrated communal areas*, similar to Horelli's [24] idea about the "*public living room*" [57,61,86,87]. The lack of these meeting spaces risks negatively impacting the sense of community and connection with the social environment [24]. Some studies, rather than referring to particular types or qualities or spaces, frame a requirement for a variety of *affordances* [21] that challenge and allow children to have fun during play [53].

3.6. Access

The many factors of CFE exploring the forms and quality of access that children have to different parts of the built environment formed a theme addressed in the vast majority (approx. 82%) of the papers. This often means *access to green and open spaces* [7,33,34,45,47,53,54,56,64,68,69,81,82,88,89], including to specific (service) facilities [35,84], or to the green spaces in a city or neighborhood [47,68,74,75,82], or a combination of the two [48]. The quality of access may also refer to the *distribution of green spaces and facilities* [64,74] or may be summarized as a *network of play spaces* [30].

Access in CFE often focuses specifically on the transition routes or mobility flows, where a central challenge in enabling and hindering access is traffic. The problem is often tackled by opting either for the *separation of traffic* (such as bicycle and pedestrian paths) [16,54], *reducing the speed/quantity of traffic* [48,49,70,84,89] or otherwise providing *safe crossings* in heavily trafficked areas [25,37,45,90]. Access in terms of the CFE often means *proximity* [21,42,44,46,49,55,72,73,77,80,91,92], *walkability* [25,41,48,50,51,53,59,81,93,94], and *connectivity* [51,70,84,95].

The access sought can also be extended to include the whole neighborhood [87]. This position can, to varying degrees, be taken by studies located in high-density areas, which highlight *multi-functionality* [62,81,96]. Studies in these kinds of places tend to view *child-friendly streetscapes* as a part of CFE [43,48,69,90,97]. This means *reclaiming the streets for other uses* [43] and, in other ways, *pedestrianizing* [27,43,47,56,80,83,87,89]. This, in turn, can include streetscapes with *cul-de-sacs* [70,83,84] and *streets with space for play* [22,69,93]. Raising children in high-density areas often involves traffic as a challenging part of the child's experience [48,97], and requires uncompromised access to green space and natural environments [48].

3.7. Safety

Safety was a commonly occurring theme of CFE across the socio-physical spectrum and was mentioned in 82% of the studies. It was often discussed not only in relation to the physical environment, such as traffic and play spaces but was also related to the social environment, as in a child's relationship with other people. Safety is examined from multiple perspectives, expressed as either standards, attitude, or feeling, and is considered an important aspect of CFE [14,21,25,26,30,33,38,41,44,45,48,54,60–63,65,69,72,77,88,97–100].

It can even be described as a basic need for a child, together with, for example, food and sleep [65].

Some factors in the physical environment can be deemed safe, meaning that a place is free from danger [81]. Many such elements are addressed in relation to CFE, ranging from *safe drinking water* [66], *safe water depth* [64], *safe materials* [69], and achieving *safety using lighting* [82], to more broadly mentioning *environmental cleanliness* [64] (detailed in the theme clean environment), *safe places* [37,63,76], and, more specifically, the finding that *designated spaces* can support safety [63]. Providing these safe environments for children can then enhance both their activity and mobility [8], and this overlaps with the theme of play and leisure. Safety standards also overlap with the theme of access. This becomes apparent in mentions of *traffic safety* [7,56,95], *safe roads* [27,96], *safe traffic system* [69], *safe and secure transitory zones* [101], and *safe routes* [56], as well as *safe paths and crossings* [90]. Traffic safety, as a common group of factors within safety standards, includes the explicit or implicit mention of traffic elements, such as *road conditions*, *standards for streetlights*, *speed humps and speed limits*, and *traffic signs* [49,56,70,84]. However, interwoven with the measures taken to create a safe environment, human factors, such as unsafe driving, can impact the safety of CFE [47].

There are a number of social or human elements that are connected to the perception of safety in CFE [27,48,61]. One central factor is the perception or *feeling of safety* [34,37,40,62,74,75,84,89], which for a child, as in the case of fear against *stranger danger* [7,33,34,45,53,80,87,88,92,95], can be impacted by *adult attitudes about danger and safety* [16,34,47,55,96,102]. It can also be linked to *parental restrictions* [28,83] set up to *protect a child from danger* [45]. Where and in what socio-economic group children grow up can affect what is considered a risk [103], and impact the opportunity of acting on such a safety appraisal [45].

3.8. Fairness and Inclusion

Of the listed themes, *fairness and inclusion* concerning various demographic groups were mentioned by over half (57%) of the studied papers (Table 2) and the theme distinguishes itself by defining how and to whom the rest of the themes may apply. Han and Kim [8], among others, linked the CFE promotion of environmental equality as a part of sustainable development, seen as being of particular weight in a broader socio-physical discussion.

Fairness and inclusion address the distribution of physical qualities and can be seen as an equal opportunity to access the city's services and spaces [33], such as leisure facilities or the amount of green space provided [53]. Besides the spatial segregation and separation of children from the public realm [57] and the segregation of play spaces [87], this also relates to social segregation and separation from adults and society [86], as well as from children of different socio-economic backgrounds [57]. The least surprising impacting factor present on the list may be *age* [24,33,42,51,76], since initial frameworks such as the CFCI and the UNCRC are premised upon the need for the inclusion of children's needs and rights. Studies focusing on this aspect of fairness and inclusion may highlight the overlap between *child-friendly spaces* and *people-friendly spaces*, as *inclusive- or integrational spaces* [37,48,95,101], as "*ageless places*" [88], or make space for the active inclusion of overlooked age groups in suchlike *age-based and intergenerational communities and -spaces*, or *child-centered community facilities* [57,60,64,86,99,104].

Another common demographical variable is *gender* [55]. In a so-called "genderified" neighborhood [103], environmental inequality manifests as a result of gender roles and norms, where gender differences can, for example, affect a child's independent mobility [16], as girls tend to be more restricted than boys [28,45,80,83]. Children might also be offered different activities based on stereotypes [54], such as making things nice and peaceful for girls while focusing on building or playfulness for boys [46,52].

Socio-economic differences are often described as having an impact on the perception of and relationship with CFE. For example, as disadvantaged neighborhoods are often perceived as less child-friendly [77], this can affect parental attitudes [105]. Moreover, parents in wealthier neighborhoods can provide children with more options, such as

organized activities [106]. However, while less wealthy households tend to give more autonomy to the children [49,106], wealthier households can exercise more control and oversight by driving children to other places or offering private outdoor spaces around the house [45]. From a fairness and inclusion perspective, CFE, then, means fair inclusion and access to the city and its spaces, regardless of ethnic or socio-economic background, religion, gender, or ability [69].

Table 2. Socio-physical themes and the respective factors of CFE.

Theme	Identified Socio-Physical Factors
Green and Open Spaces (85%)	Designed spaces, diverse and varying natural spaces, green spaces, biodiversity, appropriate sized spaces (sometimes larger sometimes smaller), un-programmed areas, informal areas, (wild) animals, lights, play equipment, loose materials, facilities (schools, libraries, playgrounds, shelters, community centers), secret places, serene places, art and color, weather protection, benches, sports fields, trash cans, crossings, water features (pond/river/fountain), a scale of elements and space adapted to children, no architectural barriers vs. fences
Access (82%)	Inclusive access, proximity, connections, urban density, traffic solutions, walkability, pedestrian areas, mobility, wayfinding and legibility of environment, distribution of green space in the city, citywide green network, public transport, traffic safety and traffic separation, safe routes, reduced spatial segregation, diverse and family-friendly housing, access to services
Safety (82%)	Safety, feeling safe, security, familiarity, designed spaces, comfort, parental attitudes, limitation of risks, children's fears, parental fears, and protection from dangers, through surveillance (with community and technology), and with parental restrictions including permitted risk-taking, adult presence and supervision, support, parental influence and control, self-protection and defense strategies, safe equipment, safe spaces, traffic safety
Fairness and Inclusion (57%)	Demography: age, gender, socioeconomic background and differences, social integration, migration, ethnicity, religion, disability, inclusivity, (environmental) justice.
Social Connection (56%)	Family, meeting peers/playmates/same-aged children, making friends, forming a network of relations, social connections, sense of belonging/community, connection to environment (place attachment), having company
Play and Leisure (48%)	Playing, activities/affordances (such as hanging out, running, walking, cycling, ball games, skateboarding, football, building, destroying, creating, walking, running, shopping, hanging out, socializing, talking, listening to music, game playing, relaxing, reading, roaming, organized activities, play, imaginative play, simple play, risky play), leisure time/downtime, alone-time, peace and quiet, improvisation, creativity, collaboration, avoiding boredom
Freedom (41%)	Freedom of expression, self-realization, taking initiative, personal agency, building autonomy, self-regulation, free time, managing risks, resolving problems, solidarity, conditions for environmental exploration, emotions (such as happiness, excitement, enjoyment, feeling free, pride, tranquility), freedom of discovery, independent exploration
Clean Environment (40%)	Environmental cleanliness, no litter, reduced air- and noise pollution, non-toxic environments, welcoming spaces, maintenance
Involvement (25%)	Events, public participation, children's involvement, children feeling involved, feeling listened to and respected, sense of/cohesive community, social order and values, (recognition of) children as active social producers, social clubs, actualizing hobbies, part-taking in purposeful play (such as garden maintenance) and playful work (such as feeding fish), sense of common responsibilities, social media platforms, participation in the promotion of CFE
Learning (20%)	Education, learning and competence development, awareness of rights, supportive learning environments, outdoor learning, sense of achievement, healthy habits

3.9. Social Connection

The theme of social connection is part of a child's participation in the socio-physical environment; it was identified in 56% of the studied papers. Central to this theme is the child's experience of connection to the physical and social environment.

From the child's perspective, social connection typically means a *feeling of belonging* [8,25,45,98]. It is closely tied to a *sense of stability* [13], *familiarity* [61], and *feeling secure* (see the theme of safety) [61,94]. When focused on the physical environment, this is also termed *place-belonging* [94], or *place attachment/attachment to place* [13,51,61,80]. It forms children's relationships with the environment, which strengthens familiarity and stability. This bond could result in the children *feeling stewardship* by wanting to take care of and protect the environment [54,105], as well as feeling a part of, and taking part in, their local environment [8]. This is also referred to as a *place-child exchange* [26,45].

Social connection is also more broadly about enabling *meetings* [75]. A child should be given opportunities to have a *network of social relationships* [33,43], such as a *cohesive sense of community* [25,27,57,76,87,98], including *social interaction and connection* [40,64,99,107]. These *diverse interactions* [71] should not only include *people of all ages* in the community [38,45] but also more generally *friendly people* [54]. In this respect, children are important to community life [107]. Children also benefit from other specific connections, such as *relatives and family members* [49,54,92], *friends* [21,57,61,76,92], and *other children* [43,84], such as *peers and playmates* [53,77]. Dense cities are connected to a lack of opportunity [47] and space [107] for children to properly form these connections. In settings where connections to peers are sparse, as in high-rise environments, the importance of, e.g., *siblings* might increase [53].

3.10. Play and Leisure

The theme of play and leisure is part of a child's participation in an environment and was identified in 48% of the studied papers. Play and leisure spaces are *negotiated between users* [92] and should offer a *wide range of affordances* (see Figure 3) [8,75], including for children's favorite activities [26], such as *sports and organized physical activity* [54], *social activities* [53], and *play* [44,52], as well as *mobility* [50]. Children are then dependent on opportunities to actualize these affordances [16,17,53].

Play and leisure often focuses on the needs of younger children. For children whose activities qualify as play, *exploration* [8,26,30,54,76,80], as well as *being challenged*, are central [51,53]. Satisfying these needs often means providing *designated play and leisure spaces*, where children have the freedom to *safely challenge themselves* [28,62,63,108]. However, children also need *possibilities for spontaneous play* [34,87] and play that is *not limited to designated play areas* [61], which is also connected to the child's right to the entire city [53]. In addition, older youths also require *places to hang out* during their leisure time [53,82] in order to *avoid boredom* [39].

3.11. Freedom

This theme was identified in 41% of the studied papers and centers on several forms of freedom that can be granted to a child [42,54,76,95]. One form is that of movement/mobility/exploration across physical space; interchangeable variants include a *freedom of movement* [34,71,81] and *independent mobility* [34,35,49,51,54,95,109]. Other variants are *freedom of exploration* [22,26,45] and *independent exploration* [22], and are important opportunities for *improvisation* [71], *creativity* [42] and *discovery* [48]. However, this can also imply freedom from something, such as *freedom from cars* [14] or *freedom from other dangers* [62,81], which can limit other opportunities, such as for adventure [27], through *supervision, restrictions* influenced by adult attitudes [80], and *lack of free time* [28,69,73].

The overarching idea of *freedom of expression* [26] includes opportunities for a child to practice *self-regulation* [26], *self-exploration* [71], and *self-realization* [21,98]. These experiences include *building autonomy* [46,98], *exercising personal agency* [42,101], *managing risks* [27,40], and *resolving problems* [40]. They also represent important opportunities to express emotions, such as *enjoyment* [40], *happiness* [8,42], *excitement* [40], and *pride* [40,42].

3.12. A Clean Environment

The succinct list of the general factors pertaining to a clean environment includes prerequisites of particular importance to CFE but that are widely recognized as a global interest beneficial to all beings. They were addressed by approx. 40% of the studies. This includes explicit mentions of *environmental cleanliness*, which can connect to *maintenance and management* activities [25,41,42,44,47,63], *systems or facilities for sanitation* [65,66,69,79,82,88], or *reducing litter* [24,25,28,42,63,78,106]. One of the most consistently mentioned manifestations of environmental cleanliness over time is a *pollution-free environment* [14,16,24,48,49,54,76,86,87,107,109]. Although this most often refers to the absence of chemical pollution, such as air pollution, this can also include noise pollution [21,25,44,53,56,73]; however, this is not a reason to limit the children's own opportunities to make noise [106].

3.13. Involvement

In 25% of the papers, *involving children* in their surrounding environment was seen as an integral part of CFE [59,68]. This not only means explicitly *recognizing children as a user group* [35], an *interest group* [107], and as *active social producers* [87], but also utilizing *effective involvement* [59] and *direct involvement* in more formal contexts such as children's councils [56], as well as informal processes [59], to shift the view of children being regarded as problems [33]. This could be achieved at different stages of planning, design, construction, or management [21,30], to foster a strong connection to the environment [25]. This can make children more active participants in society [86]. In essence, involvement entails not only children's perspectives [21] but also the promotion of children's needs for learning and development [56].

3.14. Learning

In 20% of the papers, *education* was viewed as important for CFE [56,67,86], even as a basic service [21,69,79,82]. In addition to the school-based learning system, this also refers to general learning and competence development [26], such as an *awareness of children's own rights* [56,110], teaching and learning through *collaboration* [55] and *social interaction*, where children can learn skills such as cooperation, sharing and taking turns [64]. In this sense, learning is grounded in social connection and involvement [14] and requires a supportive learning environment [77].

3.15. Socio-Physical Overlap

The ten identified socio-physical themes of CFE have been discussed to varying degrees. In the 88 papers studied, the average number of themes discussed in each paper was 5, with quite a wide overlap between some of the themes. The pattern of this overlap is demonstrated as a cross-tabulation in Table 3, below, where the horizontal correlation frequencies of a theme are shown relative to the total number of studies discussing that particular theme, along with the vertical correlation representing the consistency of occurrences within a theme.

Overall, Table 3 suggests that the themes of CFE are rather closely interlinked and that the papers studied have focused particularly on the physical spaces, access, and safety (and to some degree, also, social connection and fairness), while less focus has been placed on involvement and learning. This forms a general idea of the distribution between themes, as well as the central and peripheral topics framed by the delimitations; the low scores of involvement and learning are partly a result of excluding papers focusing on participation and school settings, while the high scores of physical spaces and access may be an extension of focusing on the term "child-friendly environments" and its characteristics. However, percentages that either align or deviate from this general distribution can also highlight specific links across themes. For example, of the (35) papers discussing a clean environment, all (100%) also discussed safety. In contrast, only 40% of the (71) studies discussing safety also addressed a clean environment, which, likely due to the high number of studies, more closely resembles the values expressed in Table 2.

Since 1998, most of the ten themes have been consistently discussed, particularly green and open spaces, as well as safety. However, if the table were also to buffer the irregularities caused by a sample size of 1/year, this would also include access and fairness. Overall, the table shows that these themes are generally discussed together, or at least, in parallel. Although the discussion may have started primarily with six out of the current ten themes, it has consistently included multiple socio-physical themes over time.

Table 3. The cross-tabulation (as a percentage) of the outlined socio-physical dimensions discussed in the same papers.

	Spaces	Access	Safety	Social Connection	Fair	Play	Freedom	Clean	Involvement	Learning
Spaces	100	83	87	61	55	53	43	43	21	20
Access	88	100	89	61	61	46	44	47	24	18
Safety	75	73	100	51	48	41	38	40	18	16
Connection	94	90	92	100	63	59	53	49	18	22
Fair	85	89	85	56	100	36	36	42	16	15
Play	93	79	84	67	47	100	49	47	19	21
Freedom	94	91	94	74	57	60	100	49	14	34
Clean	94	97	100	69	66	57	49	100	20	23
Involvement	73	77	73	41	41	36	23	32	100	23
Learning	83	72	78	61	44	50	67	44	28	100
Legend	0–19		20–39		40–59		60–79		80–99	

4. Discussion—What, How, and by Whom?

Child-friendliness as a concept includes a pursuit for the development of urban environments for the benefit of children since over 20 years. As such, the results from our analysis of the 88 papers portray a trend in the development of what is becoming an increasingly well-established socio-physical concept. This discussion relates these results to current socio-physical frameworks and challenges, focusing on what, how, and by whom the complexities of CFE can be realized.

4.1. What

The results frame CFE in terms of ten socio-physical themes. Likely due to their common frameworks (such as the UNCRC and the CFCI), a high number of common factors fell neatly into their respective themes. Despite this fact, there are many examples demonstrating how these themes relate to each other and may be dependent on each other for CFE to be realized.

Much like having a clean environment is sometimes described as a basic service [61] and can be understood as a basis for any type of sustainable development (addressed partly in the SDG goal number 3), also having available green and open spaces can be viewed as imperative to certain groups of people, such as women, children, the elderly, and people with disabilities (SDG 11.7). In the case of CFE, the availability of different kinds of spaces suitable for children is seen as particularly important for a child’s development [72]. In the results, this is seen as the need for a wide range of green and open spaces [59]. A lack of available spaces also limits the possibilities for spontaneous play [34,87], which, in turn, can limit the spaces in which to go to exercise independent mobility [8,80]. However, in densifying cities, the demands for space are often limited by the pressures of densification [107], which can result in the insufficient provision of some qualities in the open spaces [73] or in the absence of certain types of spaces, such as natural play areas [91]. The shortage of space becomes a particularly dire problem for the realization of CFE in high-density areas, where fewer alternatives leave no room for compromise [48]. This can be seen as a failure to provide a non-negotiable aspect of CFE.

As socio-physical environmental factors interplay, they can have a cascading effect across the themes of CFE, as an absence of green and open space, in turn, can affect a child’s social connection, freedom, play, learning, and involvement. A child whose movements become limited to a familiar environment may then not be offered the possibility

of challenging explorations [30], which can stifle the child's knowledge of their own surroundings [47]. This provides neither learning that is grounded in involvement [14], nor the required supportive learning environment needed for the child's development [77]. This scenario also means that the child risks not forming certain relationships or attachments, such as engaging in social interaction and getting a sense of place [34]. The lack of connection with other individuals can, in turn, make children less likely to participate in planning [86].

Provided that there are green and open spaces available, access, for example, is required. On the societal level, this is premised on the distribution of green space and facilities throughout the city [64,74], and, where unequal distribution is a problem of spatial and social segregation [57,86,87], by perpetuating unfairness and exclusivity. In this way, fairness can be seen as an equal opportunity to access the city's services and spaces [33], such as leisure facilities or green spaces [53].

On an individual level, access is premised on the familial arrangements made between a child and a caregiver. A key decision that the caregiver will make is on how to strike the balance between competing demands. On the one hand, children need to engage with the outdoor environment. On the other hand, they need to be protected from people and traffic that may be a danger to them [25]. This also means balancing the elements of a child's freedom, such as adventure [64], their right to the public realm [101], and a child's own risk-management regarding safety. In these instances, there may be a difference between feeling safe and being safe [34]. For example, a caregiver's concern about danger can lead them to regulate the child's free time, in turn, limiting the child's independent mobility [34,41,50,86], which also means that the child gets less opportunity to exercise autonomy, adventure, and measured risk-taking [27,51,54]. Too much emphasis on safety [25] can lead to over-protection [86] and is an example of how different perspectives are needed to form a fuller picture of CFE. It also demonstrates how access to environments requires that both favorable physical and social conditions are present.

4.2. How

From the start, the development of CFE has had the support of policy-based frameworks. For example, the UNCRC highlighted the three (or four) P's (protection, provision, participation (and prevention)) that are commonly referenced and used as a common vocabulary throughout the papers in this review. The framework lays out various principles, such as inclusion, the prioritization of children's needs, and their right to healthy development and involvement (articles 2, 3, 6, and 12 [11]), which continue to be central to CFE literature. These particular articles later became a point of reference for the CFCI, linking the studied papers referencing the CFCI back to the UNCRC's wider framework. The UNCRC also surfaces as an indicator for CFE in some papers highlighting policy and governance [66,67], which coincides with topics such as the child's protection from harm and the provision of sufficient environments.

The CFCI has amassed a particular sway and an early influence on the understanding of CFE, and still permeates the research literature on the topic. This framework is not only commonly referenced but also remains thematically aligned with the focus and expressed indicators of many individual cases observed in this review, showing significant overlap between the CFCI's nine-point definition (Figure 1) and the ten socio-physical themes in this study (Sections 3.5–3.14). On the whole, there also seems to be a consensus regarding viewing the CFE as an integrated socio-physical goal. However, there is a difference in the socio-physical balance between the studies and the framework; although the CFCI is specifically framed to include the physical environment, there is a tendency to emphasize social aspects, such as participation, to group together the physical factors, and offer a modest explanation on the importance of the link between them. Meanwhile, the results show a consistent tendency to primarily center the discussions on safety, social connection, and the physical environment, such as access to green and open spaces (see Tables 2 and 3.

Capturing both these separate themes and the main socio-physical links between them is important for the definition and could likely boost CFE as a socio-physical whole.

Many have recognized that CFE can help provide sustainable environments that are appropriate for all age groups in several ways [8]. However, the conceptual breadth could impact its perceived achievability, as well as the possibility to formulate a cohesive process for creating CFE in general. For this reason, and in addition to the early frameworks working toward CFE, defining a clear relationship with other sustainable development frameworks may help put this in a processual relationship, as well as to cement its importance. From 2015 onward, the CFE literature has shown a few clear overlaps with the SDGs. The CFCI describes this overlap in relation to goal 11, regarding sustainable cities and communities, which has a clear focus on inclusivity, safety, resilience, and sustainability that aligns with the most commonly discussed aspects in this review. However, there are also other common denominators, as reducing the number of road injuries and deaths (SDG 3.6), which coincides with perhaps the most common safety risk found in the studied literature, and reducing illnesses caused by harmful chemicals and pollution (SDG 3.9).

4.3. By Whom

Beyond a socio-physical concept, CFE is a vision enabled by child-centered priorities. It demands priority on many levels, such as planning [43], commercial [72], and political priorities [67]. This means prioritizing the interest of the child [79], by, for example, preserving communal nature when densifying [74]. Although the importance of CFE may not be restricted to GDP [66,67], there is also a need for making children an economic priority that can enable their needs to be met [66]. For this reason, CFE is enabled by balancing priorities and resource efficiency [67] through the processes of well-functioning democratic governance [66] and long-term perspectives [99].

The realization of CFE necessarily involves multiple activities and actors who are active within the landscape, as demonstrated both in the frameworks and in the results of this study. For example, the UNCRC's non-negotiable obligations apply to governments and individuals alike [11], although the specific articles central to the creation of the CFCI focus on government, as well as administrative and legal authorities. The CFCI also includes a wide range of actors, listing governments, stakeholders, the private sector, academia, the media, and children [11]. Similarly, the mentioned examples of SDGs (mainly number 3 and 11) address research, planning, policy, and cooperation as the *means of achieving* the goals. Many of the actors and activities are echoed in the results of this study, which highlight multiple key actors that engage in activities from planning, design, management and maintenance, participation and regulation, to education and collaboration. This collectively points to CFE being a multi-stakeholder endeavor.

As a multi-stakeholder endeavor, CFE implicates all kinds of built urban environments. It also creates a complex variation of aligning and competing interests, commonly such as densification [6]. In this regard, the individual stakeholder is a link in a long, dependent, and interconnected chain of stakeholders realizing CFE. The idea that the chain is only as strong as the weakest link means that CFE necessarily provides a platform for the systematic inclusion of the less powerful and less prioritized perspectives. This enforces the notion that the urban environment is an environment for all but that is also, in some respect, created by all. Moving forward toward a sustainable CFE, it is important that the multitudinous perspectives coming together work as a strength for CFE.

5. Methodological Discussion

There are a few given delimitations of this structured review on CFE. As the review has focused on the term "child-friendly environments" and similar, it does not claim to cover all literature that might be of relevance for the subject, and formulations including "youth-friendly" and "adolescent-friendly" were automatically filtered out by the search, as was non-English literature. Due to the chosen term, the study may not have captured factors specific to particular types of spaces but may rather represent CFE in general. The

inclusion of reviews may have led to some results being represented more than once. The exclusion of areas in certain socio-economic conditions (such as severe poverty areas and disaster areas) and the uneven global distribution of studies have probably led to an overrepresentation of socio-economically privileged contexts. For this reason, some impacting factors relating to economic safety may be underrepresented in this study. By using the socio-physical perspective, the study favored activities by professionals of the built environment. However, most studies from a child's perspective contained strong elements of participation, even if it was not the focus of the study.

6. Conclusions

- The concept of CFE has gained much recognition in separate research literature globally during the last 20 years, but there is a lack of knowledge compilation.
- The knowledge in the research literature on CFE can be grouped into ten recurring themes: green and open spaces; access; safety; fairness and inclusion; social connection; play and leisure; a clean environment; freedom; involvement; and learning. These clearly demonstrate both the social and physical aspects of CFE and their interplay.
- While all themes are of great importance for CFE and are also interdependent, the most fundamental ones can be expected to be green and open spaces, along with access.
- Despite these themes being general indicators and important for the realization of CFE, their implementation and realization in various contexts is always specific.
- An important part of the realization of CFE is through a multi-stakeholder endeavor, such as processes with governance approaches, where various actors and stakeholders engage and gain a common understanding of CFE in various contexts and scales. It requires both a child perspective, with adult society as a whole taking responsibility for children, and children's own perspectives, with children's participation.
- CFE provides the possibility not only to promote children's participation but also for implementing basic qualities in the socio-physical environments of children, as part of sustainable development. While this study provides a basis for this, future studies will need to further increase the understanding of CFE, both as a theoretical concept and as a striving toward change through various collaborative processes.

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Appendix A

Table A1. List of studies included in the literature review.

Year	Title	Authors	Method	Perspective
1998	Creating child-friendly environments: case studies on children's participation in three European countries	Horelli	Multi-method; mainly drawing, writing, discussions.	Children, (somewhat) planners and decision-makers
2001	Children's access to local environments: a case study of Christchurch, New Zealand	Tranter and Pawson	Interviews and observations	Children, parents, planners
2002	The child friendly cities initiative in Italy	Corsi	Review	Children and planners
2002	"We know something someone doesn't know": children speak out on local conditions in Johannesburg	Kruger and Chawla	Case study; drawing, mapping	Children
2003	Children's Dens	Kylin	Walking and interviews	Children and adults
2003	Bleak prospects? Urban planning, family housing and children's outdoor spaces in the capital of the Netherlands	Karsten	Review of building program	Planners, policy-makers, decision-makers
2004	The extent of children's independent mobility and the number of actualized affordances as criteria for child-friendly environments	Kyttä	Case study	Children (and parents)
2004	An internet-based design game as a mediator of children's environmental visions	Kyttä, Kaaja and Horelli	Questionnaire, playing games, interviews	Children
2005	Children's friendship with place: a conceptual Inquiry	Chatterjee	Review	
2006	Children in the city: reclaiming the streets	Karsten and van Vliet	Interview	Parents
2006	Parental perceptions of contributions of school and neighborhood to children's psychological wellness	Jutras and Lepage	Interviews	Parents
2007	Children's independent mobility: a review of recent Italian literature	Prezza	Review	Parents
2007	Environmental child-friendliness: collaboration and future research	Björklid and Nordström	Review	Collaborative
2007	Interpretations of urban child-friendliness: a comparative study of two neighborhoods in Helsinki and Rome	Haikkola, Giuseppina Pacilli, Horelli and Prezza	Interviews	Children, parents, professionals, elderly
2007	Constructing a theoretical framework for environmental child-friendliness	Horelli	Review	Youth, researchers

Table A1. Cont.

Year	Title	Authors	Method	Perspective
2007	Creating child-friendly cities: the case of Denver, USA	Kingston, Wridt, Chawla, van Vliet and Brink	Project analysis	Multiple stakeholders
2008	Space-oriented children's policy: creating child-friendly communities to improve children's well-being	Gill		
2008	Child-friendly cities and land use planning: implications for children's health	McAllister	Review and content analysis	
2008	Urban public space as a co-educator: children's socialization in Ghent	De Visscher and Bouverne-de Bie	Review, plus photographs and discussions	Children
2008	Escaping Monstropolis: child-friendly cities, peak oil and Monsters, Inc.	Tranter and Sharpe		
2010	Place matters: the significance of place attachments for children's wellbeing	Jack	Critical review of government policy	
2010	Measuring government performance in realizing child rights and child wellbeing: the approach and indicators	Mekonen	Quantitative assessment through index	Government, decision-makers
2010	Monitoring the commitment and child-friendliness of governments: a new approach from Africa	Bequele	Quantitative assessment through index	Government, decision-makers
2010	Child-friendly cities: a place for active citizenships in geographical and environmental education	Wilks	Multi-method; mapping, surveys, etc.	Children and youth
2010	The hope for oil crisis: children, oil vulnerability and (in)dependent mobility	Sharpe and Trenter		
2010	Urban research and child-friendly cities: a new Australian outline	Woolcock, Gleeson and Randolph	Review	Research
2010	Children's views on child-friendly environments in different geographical, cultural and social neighborhoods	Nordström	Questionnaire	Children
2010	The journey and the destination matter: child-friendly cities and children's right to the city	Whitzman, Worthington and Mizrachi	Case study, multi-method	Multiple stakeholders
2011	Mapping and characterizing children's daily mobility in urban residential areas in Turku, Finland	Fagerholm and Broberg	Multi-method	Children
2011	Child-friendly urban environment and playgrounds in Warsaw	Pawlikowska-Pietchotka	Survey	Children and caregivers
2012	Garden affordances for social learning, play and building nature-child relationships	Laaksoharju, Rappe and Kaivola	Multi: content analysis, ethnography	Children

Table A1. Cont.

Year	Title	Authors	Method	Perspective
2012	Creating child-friendly high-rise environments: beyond wastelands and glasshouses	Whitzman and Mizrachi	Multi-method	Children, youth, parents
2012	Living on a rural island: children identify assets, problems and solutions for health and well-being	Pivik	Multi-method	Children, youth, adults around children
2013	City children and genderified neighborhoods: the new generation as urban regeneration strategy	Van den Berg	Discourse analysis	Gender-based
2013	Crafting child-friendly cities: evidence from Biratnagar sub-metropolitan city, eastern Nepal	Nikku and Pokrehl	Interviews, focus group, secondary data	Stakeholders
2013	Assessment of the child-friendliness of the Küçük Ayasofya Neighborhood in Istanbul, Turkey	Tandogan and Ergun	Survey	Children, (parents and educators)
2013	Building child-friendly cities in the MENA region	Nour		
2013	Child-friendly urban structures: Bullerby revisited	Broberg, Kytta and Fagerholm	SoftGIS survey	Children
2013	“The future lies in our hands”: children as researchers and environmental change agents in designing a child-friendly neighborhood	Malone	Multi-method: drawings, discussions, interviews, surveys.	Children
2013	Children’s nomination of friendly places in an urban neighborhood in Shiraz, Iran	Ramezani and Said	Interviews	Children
2014	Lack of child-environment congruence in Cherbourg, Australia: obstacles to well-being in an indigenous community	Kreutz	Multi-method; photo, interviews, etc.	Children (parents and educators)
2015	Kids in the city: children’s use and experiences of urban neighborhoods in Auckland, New Zealand	Carroll, Witten, Kearns and Donovan	Multi-method, mainly interviews	Children (and parents)
2015	Children’s rights and the crisis of rapid urbanization	Malone		Policymakers
2015	Middle-class households with children on vertical family living in Hong Kong	Karsten	Multi-method, mainly interviews	Parents
2015	Children’s perspectives on their urban environment and their appropriation of public spaces in Mexico City	Gülgönen and Corona	Multi-method, mainly interviews	Children
2015	Child-friendly cities in a globalizing world: different approaches and a typology of children’s roles	van Vliet and Karsten		

Table A1. Cont.

Year	Title	Authors	Method	Perspective
2015	Listening to “Generation Jacobs”: A case study in participatory engagement for a child-friendly city	Ellis, Monaghan and McDonald	Photovoice	Children and planners
2015	Child-friendly New Westminster	Ross	Survey	Children, youth, parents
2015	Making cities more child- and nature-friendly: a child-focused study of nature connectedness in New Zealand cities	Freeman, van Heezik, Hand and Stein	Multi-method, mainly interviews	Children
2015	Urban inclusion as wellbeing: exploring children’s account of confronting diversity on inner-city streets	Witten, Kearns and Carroll	Walking interviews and group discussions	Children
2015	Age- and child-friendly cities and the promise of intergenerational space	Biggs and Carr		
2016	Can the neighborhood built environment make a difference in children’s development?	Villanueva, Badland, Kvalsvig, O’Connor, Christian, Woolcock, Giles-Corti and Goldfeld	Review	
2016	Youth master plans as potential roadmaps to creating child- and youth-friendly cities	Cushing	Multi-method	Stakeholders
2016	Pop-up kids: exploring children’s experience of temporary public space	McGlone	Multi-method; mainly interviews	Children
2016	The role of green spaces and their management in a child-friendly urban village	Jansson, Sundevall and Wales	Child-led walks/interviews	Children
2016	Assessing the play provisions for children in urban neighborhoods of India: Case study Nagpur, Maharashtra	Bhonsle and Adane	Multi-method	Children, parents
2016	“Because we are all people”: outcomes and reflections from young people’s participation in the planning and design of child-friendly public spaces	Derr and Tarantini	Multi-method	Children, youth
2017	Association between the built environment and children’s independent mobility: a meta-analytic review	Sharmin and Kamruzzaman	Meta-analysis (review)	Researchers
2017	How participatory processes impact children and contribute to planning: a case study of neighborhood design from Boulder, Colorado, USA	Derr and Kovács	Multi-method	Children and youth
2017	Preschoolers’ perceptions of neighborhood environment, safety, and help-seeking	Katz, McLeigh and El szwek	Interviews and focus groups	Children

Table A1. *Cont.*

Year	Title	Authors	Method	Perspective
2017	Managing the challenges of combining mobilities of care and commuting: an Australian perspective	Grant-Smith, Osborne and Johnson	Literature study	Female adults
2018	A critical review of child-friendly environments, focusing on children's experiential perspectives on the physical world for sustainability	Han and Kim	Review	Research
2018	An approach towards the planning of green child-friendly spaces in South Africa	Cilliers and Cornelius	Literature study and case study	Experts
2018	What can the urban designer do for children? Normative principles of child-friendly communities for responsive third places	Elshater	Multi-method	Children, planners
2018	Integrating youth in city planning: developing a participatory tool toward a child-friendly vision of Eastern Wastani –Saida	Saridar Masri	Multi-method	Children
2018	Participatory retrofitting of school playgrounds: collaboration between children and university students to develop a vision	Menconi and Grohman	Workshops	Children, students, researchers
2019	A child-friendly city: a youth creative vision of reclaiming interstitial spaces in El Mina (Tripoli, Lebanon)	Mohareb, Elsamahy and Felix	Multi-method	Youth
2019	Examining the social and built environment factors influencing children's independent use of their neighborhoods and the experience of local settings as child-friendly	Loebach and Gilliland	Multi-method	Children
2019	Considering the natural environment in the creation of child-friendly cities: implications for children's subjective well-being	Adams, Savahl, Florence and Jackson	Interviews	Children
2019	A prefigurative politics of play in public places: children claim their democratic right to the city through play	Carroll, Calder-Dawe, Witten and Asiasiga	Multi-method	Children
2019	The creation of rural child-friendly spaces: a spatial planning perspective	Cilliers and Cornelius	Interviews	Experts
2020	Play, work, and rest: the developmental affordances of designated child-friendly public spaces in Jakarta, Indonesia.	Arlinkasari	Multi-method; interviews, drawing activities, observations and child-led tours	Children
2020	A qualitative investigation of unsupervised outdoor activities for 10- to 13-year-old children: "I like adventuring but I don't like adventuring without being careful"	Brussoni et al.	Go-along interviews	Children
2020	Challenges of utilizing child-friendly public spaces in Ilorin, Nigeria	Aisha Tayo, bin Rashidi and Bin Said	Survey research design (purposive sampling technique)	Children and adults

Table A1. Cont.

Year	Title	Authors	Method	Perspective
2020	Children's green walk to school: an evaluation of welfare-related disparities in the visibility of greenery among children	Laszkiewicz and Sikorska	Spatially explicit databases (high-resolution color-infrared (CIR) orthophoto map and Sentinel-2 multispectral imagery) quantifying visibility of green spaces	Children
2020	Construction of a children-friendly landscape environment with functions of psychological treatment and physical rehabilitation	Liu	Multi-dimensional perspective (key index) and bibliographical retrieval	Professionals
2020	Living outside the house: how families raising young children in new, private high-rise developments experience their local environment	Andrews and Warner	Participatory method (Photovoice)	Parents
2020	Pre-schoolers' vision for livable cities: creating 'care-full' urban environments	Ergler, Freeman and Guiney	Participatory research project (neighborhood walks and tile-based mapping exercise)	Children
2020	The public value of child-friendly space—reconceptualizing the playground	Pitsikali, Parnell and McIntyre	Ethnographic study (observation, visual mapping and semi-structured interviews)	Adults and children
2020	The right to the city in the Platform Age: child-friendly city and smart city premises in contention	van der Graaf		Professionals
2020	Toward a green and playful city: understanding the social and political production of children's relational wellbeing in Barcelona	Pulgar, Anguelovski and Connolly	Ethnographic and archival analysis	Professionals
2020	Understanding children's neighborhood destinations: presenting the kids-poND framework	Egli, Villanueva, Donnellan, Mackay, Forsyth, Zinn, Kytta and Smith	Open-ended survey questions	Children
2020	Understanding children's perceptions and activities in urban public space: The case study of Zrebar Lake Waterfront in Kurdistan	Mansournia, Bahrami, Mahmoudi Farahani and Aram	Mixed method: behavior and mental mapping (sketches)	Children
2020	Tourism destination management strategy for young children: willingness to pay for child-friendly tourism facilities and services at a heritage site	Song, Park and Kim		Visitors
2020	What is a healthy place? Models for cities and neighborhoods	Forsyth	Conceptualization: a review of research and practice	Professionals

Table A1. Cont.

Year	Title	Authors	Method	Perspective
2020	Learning to belong? “Culture” and “place-making” among children and young people in Hull, City of Culture, UK, 2017	Ploner and Jones	Qualitative/participative focus groups (semi-structured)	Children, educators and cultural practitioners
2020	Policy innovation on building child-friendly cities in China: evidence from four Chinese cities	Nan	Case study comparison	Professionals
2020	Policies to enable children’s voice for healthy neighborhoods and communities: a systematic mapping review and case study	Sullivan, Egli, Donnellan and Smith	Systematic mapping review	Professionals

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