



## How does the school built environment impact students' bullying behaviour? A scoping review

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### ABSTRACT

**Rationale:** School bullying is a public health concern affecting the physical and mental health of children and young people. While school-based interventions to prevent bullying have been developed internationally, the effectiveness of many interventions has been mixed and modest. Despite a growing recognition that the school built environment may impact bullying behaviour, few anti-bullying interventions have addressed the built environment.

**Objective:** This systematic scoping review explored existing literature for evidence that the school built environment influences bullying behaviour in school students.

**Methods:** The review was guided by Arksey and O'Malley's methodological framework for scoping reviews. A search of six databases (Medline, PsycINFO, ERIC, EMBASE, CINAHL Plus and The Cochrane Library) identified studies addressing primary, middle and secondary school students, bullying, school bullying locations, and school built environments. Peer-reviewed journal articles published in English prior to July 19, 2021, were included.

**Results:** In total, 7568 documents were screened by title and abstract. Following a full-text review, 61 studies (63 articles) were selected; 43 studies identified school bullying locations, and 19 studies linked features of the school built environment to bullying behaviour. Classrooms, playgrounds, and corridors were identified as common bullying locations. Features of the school built environment linked to bullying behaviour included security cameras, architectural design, aesthetics, seating, and vandalism.

**Conclusions:** This review identified key school settings for anti-bullying interventions and identified gaps in existing built environment and bullying literature. Further analyses of published studies will inform anti-bullying policy and practice.

### 1. Introduction

Bullying is recognised as a major public health concern affecting children and young people globally; a meta-analysis of 80 international studies of young people aged 12–18 years reported mean bullying prevalence rates of 35% for involvement in face-to-face bullying and 15% for cyber bullying (Modecki et al., 2014; Srabstein and Leventhal, 2010). Defined as the repeated, intentional harm or humiliation of a

person who has less power than the aggressor (Olweus, 1993; Vaillancourt et al., 2010), bullying can include physical attacks (e.g., pushing), verbal harassment (e.g., name calling), spreading rumours, obscene gestures, and social exclusion (Moore et al., 2017). Bullying has been associated with physical and mental health problems such as anxiety and depression, increased risk of self-harm, attempted or completed suicide, poor academic performance, and criminality and delinquency (Juvonen et al., 2011; Lereya et al., 2015; Olweus, 1993; Ttofi et al.,

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2011; Vaillancourt et al., 2010). Furthermore, the long-term adverse effects of peer bullying on adult mental health can be worse than child abuse and maltreatment (Lereya et al., 2015). Adults who were bullied during childhood are at greater risk of unemployment and accumulating less wealth than adults who were not bullied (Brimblecombe et al., 2018).

A number of school-based interventions to prevent bullying have been developed internationally, with many interventions including multiple program components, such as changes to school policy and climate, classroom rules, curriculum and parent engagement (Gaffney et al., 2021). Although there is evidence of school-based interventions reducing bullying perpetration and victimisation, the effectiveness of interventions remains mixed (Fraguas et al., 2021; Gaffney et al., 2021). Furthermore, many interventions cease to be effective after grade 9, with some programs inadvertently increasing bullying behaviour (Yeager et al., 2015). The effect size of many bullying interventions has also been modest, with Gaffney, Tofi, and Farrington's (2019) meta-analysis of 100 studies reporting that the average reduction attributed to bullying prevention programs was 19–20% in perpetration and 15–16% in victimisation. New approaches to prevent bullying are therefore needed.

There is growing evidence that a school's built environment can create or modify opportunities for bullying behaviour to occur, with the built environment defined as "all buildings, spaces and objects that are created or modified by people" (p.S87) (Sallis, 2009). A safe and healthy built environment has been recognised by the World Health Organization as an essential component of a health-promoting school (World Health Organization, 2004). Numerous studies have identified bullying locations or "hotspots" where bullying frequently occurs within schools, such as school playgrounds and classrooms (e.g., Fite et al., 2013; Vaillancourt et al., 2010). Yet, few studies have explored how specific features of these locations influence bullying behaviour or reduce related behaviours, such as school violence and crime (Fram and Dickmann, 2012; Johnson, 2009; Wilcox et al., 2006). Similarly, bullying prevention programs rarely incorporate policies and practices that explicitly address the school built environment.

With governments and schools investing increasing amounts of money into anti-bullying interventions, reviews that summarise current evidence and inform the development of effective strategies to reduce bullying are needed. Architects, sociologists, and educational researchers have also called for evidence-based school design guidelines to reduce social, psychological, and safety problems (Fram and Dickmann, 2012). To date, there have been no systematic or scoping reviews published in peer-reviewed journals that have explored the role of the school built environment on bullying behaviour. The current review is therefore timely and warranted.

A scoping review was chosen as the most appropriate methodology for synthesising a body of evidence that is yet to be comprehensively reviewed (Harfield et al., 2018). Scoping reviews map research areas by identifying underlying key concepts and summarising the sources and types of evidence available (Mays et al., 2001). They do not typically assess the quality of included studies (Levac et al., 2010). The aim of this scoping review was to explore the existing literature for evidence that the school built environment influences bullying behaviour in school students aged 4–18 years. The specific research questions were:

- i. Where does bullying frequently occur in schools?
- ii. What features of the school built environment prevent or exacerbate bullying behaviour?
- iii. What are the gaps in research investigating the influence of the school built environment on bullying behaviour?

## 2. Methods

This review was guided by Arksey and O'Malley's methodological framework for conducting scoping reviews and the Preferred Reporting

Items for Systematic Reviews and Meta-Analysis Protocols extension for scoping reviews (PRISMA-ScR) (Arksey and O'Malley, 2005; Tricco et al., 2018). The review included the following steps: identifying the research questions, identifying relevant results, selecting studies for inclusion, charting the data, and collating, summarising, and reporting the results (Arksey and O'Malley, 2005).

### 2.1. Inclusion and exclusion criteria

Table 1 provides a summary of the inclusion and exclusion criteria for this review.

**Table 1**  
Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
<p><b>Document type:</b></p> <ul style="list-style-type: none"> <li>• All peer-reviewed journal articles published in English prior to July 2021.</li> </ul>	<p><b>Document type:</b></p> <ul style="list-style-type: none"> <li>• Editorials</li> <li>• Letters to the editor</li> <li>• Opinion papers</li> <li>• Magazine articles</li> <li>• Books and book chapters</li> <li>• Book reviews</li> <li>• Poster and conference abstracts</li> <li>• Reports</li> <li>• Study protocols</li> <li>• Dissertations</li> <li>• Research-based commentaries</li> </ul>
<p><b>Study design:</b></p> <ul style="list-style-type: none"> <li>• Qualitative</li> <li>• Observational</li> <li>• Mixed methods</li> <li>• Case studies</li> <li>• Interventions</li> <li>• Literature reviews</li> </ul>	<p><b>Study design:</b></p> <ul style="list-style-type: none"> <li>• Interventions lacking sufficient data to draw conclusions about how the built environment impacts bullying</li> </ul>
<p><b>Population:</b></p> <ul style="list-style-type: none"> <li>• Staff, students (aged 4–18 years) and parents from primary, middle and secondary schools</li> </ul>	<p><b>Population:</b></p> <ul style="list-style-type: none"> <li>• Staff, students and parents from pre-school (including kindergarten) only</li> <li>• Staff, students and parents from universities or post-secondary education</li> <li>• Adults' retrospective experiences of bullying as children</li> </ul>
<p><b>Setting:</b></p> <ul style="list-style-type: none"> <li>• Studies conducted within formal school settings</li> </ul>	<p><b>Setting:</b></p> <p>Studies conducted in any of the following settings:</p> <ul style="list-style-type: none"> <li>• School buses</li> <li>• Other education settings (e.g., training centres)</li> <li>• Community settings</li> <li>• Workplace settings</li> <li>• Hospital/clinical settings</li> <li>• Institutional settings (e.g., out-of-home care; detention centres)</li> </ul>
<p><b>Outcome:</b></p> <ul style="list-style-type: none"> <li>• Bullying or peer victimisation</li> <li>• Fear of bullying or peer victimisation</li> </ul>	<p><b>Outcome:</b></p> <ul style="list-style-type: none"> <li>• Teacher-student bullying</li> <li>• Cyberbullying</li> <li>• Perceived safety and location avoidance</li> </ul>
<p><b>Exposure (Built environment):</b></p> <ul style="list-style-type: none"> <li>• [Bullying location data]: Bullying locations (e.g., playground, classroom, cafeteria) identified from questions that enabled identification of more than one bullying location within the school</li> <li>• Built environment features of school locations consistent with the definition of built environment<sup>a</sup></li> </ul>	<p><b>Exposure (Built environment):</b></p> <ul style="list-style-type: none"> <li>• [Bullying location data]: Bullying locations identified from questions about a single location within the school</li> <li>• [Bullying location data]: Bullying locations outside of the school grounds (e.g., on the way to/from school, school bus) or where the location could not be identified (e.g., recess or lunch break)</li> <li>• Uniforms and identification badges</li> <li>• Weapons</li> <li>• Information and Communication Technology (e.g., computers, mobile phones)</li> <li>• Scales comprised of both built environment and non-built environment items</li> </ul>

<sup>a</sup> The built environment is defined as all buildings, spaces and objects that are created or modified by people.

## 2.2. Study designs

Study designs included qualitative, observational (cross-sectional), mixed-methods, case-studies, interventions, and literature reviews.

## 2.3. Study population and setting

Study populations included students attending primary, middle or secondary schools (aged 4–18 years), and their parents and school staff (e.g., principals, teachers, psychologists). When describing school levels, “primary” was used interchangeably with “elementary” schools, and “secondary” was used interchangeably with “high”, reflecting differences between countries. Only studies conducted within formal school settings were included.

## 2.4. Phenomenon of interest

Studies needed to discuss bullying and/or victimisation in relation to school built environment feature(s) to be included in the review.

**Outcome.** Bullying and peer victimisation are often used interchangeably in the published literature and are described in this review as the repeated, intentional harm or humiliation of a person who has less power than the aggressor. Given the dearth of literature exploring the school built environment and bullying, included articles contained measures reflecting the chosen definition of bullying, as well as articles that referred to bullying without providing a definition. Perceived safety and location avoidance were excluded from the review as they are often unrelated to bullying. Cyberbullying was also excluded as the school built environment is likely to have a larger impact on traditional forms of bullying than cyberbullying (Williford et al., 2018).

**Exposure.** Bullying location data were restricted to studies that allowed participants to identify bullying locations within the whole school, either from open-ended questions or multiple location response categories (including those containing an ‘other’ category). Features of the built environment were consistent with the definition of “all buildings, spaces, and objects that are created or modified by people” (p.87) (Sallis, 2009) and included fixed buildings and greenspaces, and moveable furniture, public artworks, and recreational equipment. Reported locations that existed outside the school’s footprint (e.g., the school bus or travelling to or from school) were excluded from the review. Response categories depicting school breaktime (e.g., recess) were also excluded as students’ location during breaktimes could not be determined. Items usually located on a person rather than within the school, such as uniforms, identification badges, weapons, and mobile phones, were excluded.

## 2.5. Search strategy

An initial search of electronic journal databases was conducted to identify article keywords exploring the school built environment and bullying. Guided by the agreed upon built environment definition and the initial keyword identification process, combinations of the following keywords were used: school\* AND (bully\* OR bullie\* OR “peer victim\*” OR “youth victim\*” OR “student victim\*”) AND (environment\* OR playground\* OR oval\* OR locker\* OR toilet\* or washroom\* OR bathroom\* OR canteen\* OR café\* OR hall\* or classroom\* OR building\* OR librar\* OR window\* OR greenspace\* OR “green space\*” OR natur\* OR grass OR shade OR seat\* OR “sport\* equipment”) (Appendix A). Publications that included these keywords in the title or abstract were searched from six databases: Medline, PsychINFO, ERIC, Embase, Cinahl PLUS, The Cochrane Library. The reference lists of all full-text articles included in the review were also screened. All documents published prior to July 19, 2021 were included.

## 2.6. Study selection

Search results were exported from electronic databases into Endnote by one reviewer. After removing duplicate records, search results were imported into an online systematic review program, Covidence (<https://www.covidence.org/>), and screened by title and abstract by two reviewers. Two reviewers screened full-text records. Reviewers recorded their reasons for inclusion and exclusion and discussed differences until a consensus was reached. Where necessary, a third reviewer was consulted.

## 2.7. Charting the data and analysis

Data extraction was completed by two reviewers and included: author(s), year of publication, journal, title, study aim, study location (country), document type, study design, data collection methods, study sample, setting, bullying outcome, built environment variable, findings, school built environment variables that exacerbated, prevented or showed no association with bullying, methodological limitations, gaps in the published literature, and future research recommendations.

## 2.8. Summarising and reporting results

The literature was examined and grouped according to: i) characteristics of included studies; ii) school bullying locations; iii) built environment features of school bullying locations linked to bullying behaviour; and iii) gaps in the published literature.

## 3. Results

The search of databases identified 7568 records for inclusion. After removing duplicates, 5164 records were screened by title and abstract and 257 articles were retrieved for full-text review. A total of 207 papers were excluded following full-text review, with reasons for exclusion provided in Fig. 1. After full-text review, 48 peer-reviewed journal articles were included from the search of databases, and 15 articles were identified via websites or reference lists of included papers. The final 63 articles described 61 studies, with two articles combined into one study on two occasions. The resulting 61 studies are summarised in Appendix A.

### 3.1. Characteristics of studies

Studies included in the review were published between 1993 and 2021 and conducted in 24 countries, with 41% ( $n = 25$ ) from the USA. Seven studies were conducted in Canada, three in England, and two in Italy, Turkey, Australia, Malaysia, and Greece. One study was conducted in Malta, New Zealand, Netherlands, South Africa, Portugal, Slovakia, Brazil, Indonesia, Taiwan, France, Mexico, Sweden, Ireland, Northern Ireland, Thailand, and both England and Germany.

Forty-six studies contained samples comprising only students, five studies contained samples of only school staff (e.g., teachers, principals) and 10 studies containing more than one type of participant. Of these 10 studies, seven included students and school staff, two included students and parents, and one included students, school staff, and parents.

Seventeen studies contained samples from only primary schools, nine from only middle schools, and seven from only secondary schools. An additional 17 studies were conducted with more than one school level. Eight studies did not state the school level but did provide information regarding the age of students attending the school. Thirty-seven studies reported on a student’s age with ages ranging between 5 and 18 years. Of the 15 studies including school staff or parents, only three studies reported adults’ ages, which ranged between 22 and 65 years.

A variety of methods were used to collect data on the school built environment and/or bullying, including surveys ( $n = 46$ ), secondary analysis of survey data ( $n = 4$ ), interviews ( $n = 10$ ), observation ( $n = 7$ ),

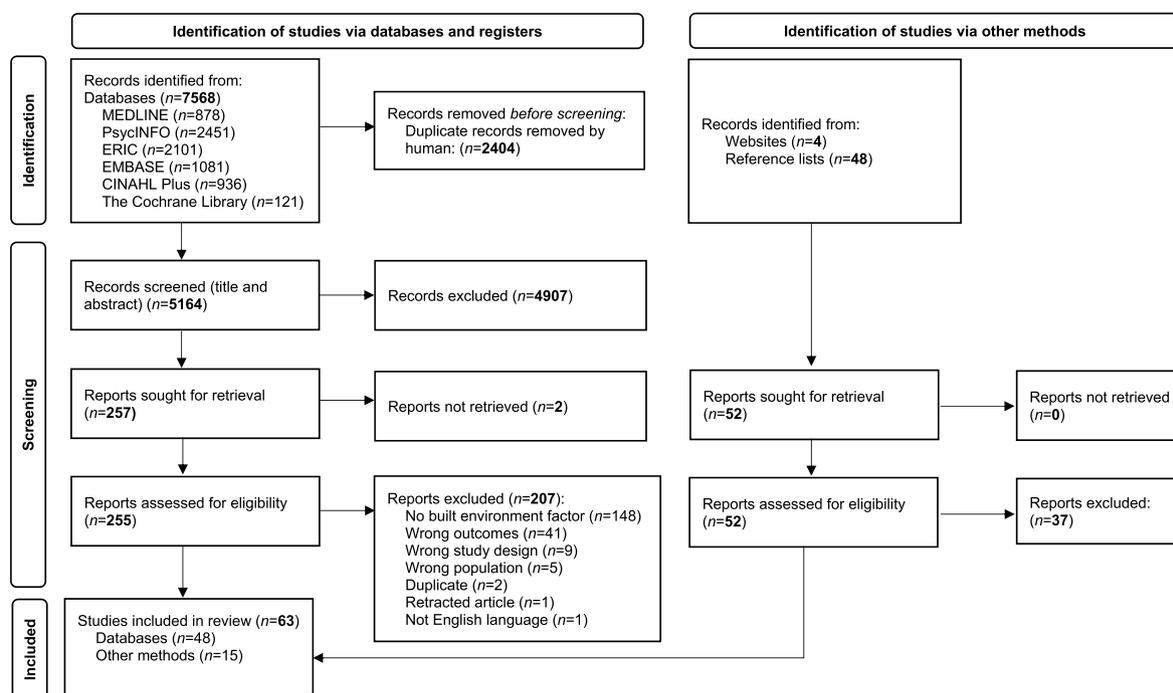


Fig. 1. PRISMA flow diagram (Page et al., 2021).

focus groups ( $n = 2$ ), videos ( $n = 2$ ), mapping ( $n = 2$ ), photography ( $n = 2$ ), artwork ( $n = 1$ ) and review of policy documents ( $n = 1$ ). Only one study reported longitudinal findings, with Bates et al. (2018) assessing whether changes in bullying behaviour following green schoolyard renovations were maintained over time.

Forty-three studies identified bullying locations within schools and 19 studies linked a built environment feature of school bullying locations to bullying behaviour, with one of these studies both identifying bullying locations and linking built environment features to bullying (Fram and Dickmann, 2012). These studies are described below.

### 3.2. School bullying locations

Of the 43 studies that identified school bullying locations, 36 studies reported the classroom as a bullying location, followed by the schoolyard/playground ( $n = 30$ ), hallway/corridor ( $n = 28$ ), bathroom ( $n = 16$ ), cafeteria/lunchroom ( $n = 14$ ), gymnasium or changeroom ( $n = 7$ ), lockers ( $n = 7$ ), front of school ( $n = 3$ ), back of school ( $n = 1$ ), school carpark ( $n = 1$ ) and bicycle racks ( $n = 1$ ) (Table 2).

Sixteen studies explored differences in bullying location by gender. In studies presenting descriptive data, the most frequent bullying locations for males included the classroom ( $n = 4$ ), playground ( $n = 2$ ), and hallway ( $n = 1$ ). For females, the most frequent bullying locations were the classroom ( $n = 6$ ) and hallway ( $n = 1$ ). Studies that tested for statistical differences between bullying location frequencies for males and females reported inconsistent findings. For example, Baldry and Farington (1999) found that males in middle school were significantly more likely to be bullied in bathrooms than females, while Collins et al. (2004) found females in secondary school were significantly more likely to be bullied in bathrooms than males. In another study, females attending a school in England reported significantly more bullying in a classroom than males, while no gender differences regarding bullying location were identified in German school students (Wolke et al., 2001).

Thirteen studies explored differences in bullying location by school level. For example, Rapp-Paglicci et al. (2004) compared elementary and middle school students and found more elementary school students were bullied on the playground and in bathrooms and more middle school students were bullied in hallways. Similarly, Borg (1999) found

that significantly more primary than secondary school students were bullied in playgrounds, while significantly more secondary than primary school students were bullied in classrooms. Studies used different analytical approaches when summarising their findings about bullying location and school level. While some studies only reported frequencies of bullying in different locations by school level (e.g., Rapp-Paglicci et al., 2004), others reported frequencies by school level, gender, and region (e.g., Genta et al., 1996) or conducted statistical analyses to obtain significant differences in bullying location by school-level (e.g., Borg, 1999).

School bullying locations may differ according to the type of bullying, with one study identifying lunchrooms as the most frequent bullying location for both males and females experiencing weight-based victimisation (Puhl and Luedicke, 2012). Similarly, bullying was not always spread equally across the same type of location within a school. Migliaccio et al.'s (2017) use of Geographic Information Systems (GIS) to identify bullying locations with 741 American students in grades 4 to 6 found some bathrooms were more prone to bullying incidents than others. This was also true for classrooms, suggesting that bullying is influenced by multiple factors, such as policies limiting student access within the school, and differences in classroom management, class structure, and location characteristics (Migliaccio et al., 2017).

### 3.3. School built environment features linked to bullying

Nineteen studies explored potential associations between school built environment features of bullying locations and bullying behaviour. Table 3 presents the school built environment measures reported in each study. Only one of the 19 studies exploring associations between school built environment features and bullying used the term 'built environment', describing it in the results as a combination of environmental and architectural changes (Fram and Dickmann, 2012). Parrish et al. (2012) used the term 'school environments' to encompass physical and psychosocial environment variables, while Horton et al. (2020) explored spatiality and school design. Spatial elements were categorised as structural (e.g., school policies), environmental (e.g., student density, architectural design), and social (e.g., interactions). All other articles included in the review contained keywords that reflected the chosen

**Table 2**  
Bullying locations within schools<sup>a</sup>.

Author, year	Classroom	School yard or playground	Hallway or corridor	Bathroom	Cafeteria	Gymnasium or changeroom	Lockers <sup>b</sup>	Front of school	Bike racks	Back of school	School carpark
Albdour and El-MasriHong (2020)	x		x	x	x	x					
Baldry (1998); Baldry & Farrington (1999)	x	x	x	x							
Bentley & Li (1995)	x	x	x								
Borg (1999)	x	x	x								
Bradshaw et al. (2007)	x	x									
Buchanan & Winzer (2001)	x	x									
Carroll-Lind & Kearney (2004)	x	x									
Collins et al. (2004)	x	x	x		x						
Dardiri et al. (2020)	x	x			x						
Espelage & Asidao (2001)	x		x	x	x		x				
Fekkes et al. (2005)	x	x	x	x	x	x			x		
Fite et al. (2013)		x									
Fram & Dickmann (2012)		x	x								
Genta et al. (1996)	x	x	x								
Harris (2004)	x				x						
Isernhagen & Harris (2003)	x				x						
Isernhagen & Harris (2004)	x				x						
Kalliotis (2000)	x	x	x								
Kartal (2008)	x	x	x	x				x			
Laeheem et al. (2009)	x	x									
Meraviglia et al. (2003)	x	x	x		x						
Migliaccio et al. (2017)		x	x	x							
Mischel & Kitsantas (2020)	x		x								
Mosia (2015)	x	x	x	x							
O'Connor & Graber (2014)						x	x				
O'Moore et al. (1997)	x	x	x	x		x	x				
Parault et al. (2007)					x						
Pereira et al. (2004)	x	x	x								
Perkins et al. (2014)	x	x	x	x		x					
Poláková (2018)	x	x	x	x				x			
Puhl & Luedicke (2012)	x			x		x	x				
Rapp-Paglicci et al. (2004)	x	x	x	x	x		x				
Rivers & Smith (1994)	x	x									
Sampaio et al. (2015)	x		x	x							
Sapouna (2008)	x	x	x	x	x	x					
Slee (1995)	x	x									
Smith & Shu (2000)	x	x									
Vaillancourt et al. (2010)	x	x	x	x	x		x			x	x
Whitney & Smith (1993)	x	x	x								
Williams et al. (2018)			x								
Williford et al. (2018)	x	x	x	x	x						
Wolke et al. (2001)	x	x	x					x			
Yahaya et al. (2009)	x										
<b>Total</b>	<b>36</b>	<b>30</b>	<b>28</b>	<b>16</b>	<b>14</b>	<b>7</b>	<b>7</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>1</b>

<sup>a</sup> Study results or findings that did not meet our school bullying location or built environment inclusion criteria are not presented.

<sup>b</sup> Lockers may be located in changerooms, corridors and other school spaces.

built environment definition.

Of the built environment measures included in this review, security cameras were explored most frequently ( $n = 6$ ), followed by architectural design and layout ( $n = 4$ ). Three studies each explored aesthetics (e.g., garden beds), seating, graffiti and vandalism, anti-bullying

brochures and size of the space. Two studies explored school cleanliness or fixed playground equipment, and one study explored fencing, security bells, classroom decorations, proximity of bullying location to closest building, metal detectors, public artwork, non-fixed play equipment (e.g., balls), availability of diverse spaces or presence of necessary spaces

**Table 3**  
Description and measures of school built environment features.

Author, year	Built environment feature	Built environment measure relevant to review
Bates et al. (2018)	Renovated green schoolyards, updated green spaces and play facilities.	Pre and post-renovation images published in the article. Renovation included replacing concrete with grass, new seating and garden beds (beautification of the school grounds).
Blosnich & Bossarte (2011)	Security cameras on school property	Survey item: "Does your school take any measures to make sure students are safe? For example, does the school have: [security cameras to monitor the school]?" (yes/no/don't know).
Brewer et al. (2017); Brewer et al. (2018)	School disorder: presence of graffiti (specifically hate related words or symbols)	Survey item: How often did you see hate related words written in school? (Never, Almost Never, Sometimes, Most of the time).
Broll & Lafferty (2018)	Security cameras on school property	Survey item unavailable. Schools that used one or more security cameras to monitor the school were coded "1" and all others were coded "0".
Chen & Chen (2018)	School safety facilities including surveillance cameras and security bells; Classroom decorations with anti-bullying elements, Bullying prevention brochures, Anti-bullying slogans and posters	Survey items: Teachers were asked to assess the implementation levels of anti-bullying strategies in their schools (never, poor, average, good, excellent) and evaluate the perceived effectiveness of anti-bullying strategies (very ineffective, ineffective, average, effective and very effective). Relevant strategies included: bullying prevention brochures, anti-bullying slogans and posters, classroom decorations with anti-bullying elements, school safety facilities (e.g., surveillance cameras and security bells, anti-bullying videos and books for teachers and students).
Clarke (2018)	Play time: Buddy bench (seating)	15 hours of playground observation of children. Interviews with primary school staff, faculty, and parents. Analysis of children's "before and after the buddy bench" artwork: article included pictures drawn by children of their buddy bench and what it meant to them.
Craig & Pepler (1997)	Distance of bullying location (playground) to building	Observers marked locations of bullying episodes on detailed site plans of school property. Proximity of bullying episode to school building was: 120 feet of school building, 120–240 feet of school building and >240 feet from school building.
Craig et al. (2000)	Features of playground: unstructured, free-ranging play and loosely supervised. Features of classroom: structured, small defined spaces.	Observations of video footage of bullying in classroom and playground. Classroom described as small, defined space. Playground described as unstructured, free ranging and loosely supervised.

**Table 3 (continued)**

Author, year	Built environment feature	Built environment measure relevant to review
Cunningham et al. (2010)	School design and layout: restructuring high-risk settings (eg. Portable classrooms) to increase monitoring and supervision, anti-bullying posters	Comments regarding the school built environment were made in response to the following questions: "Can anyone give us an example of something that schools are doing to help stop bullying?" with the following prompts: "Do you think this reduces bullying at school?"; "What do other students think?"; and "Why do you think this reduces bullying at school?" The facilitator then asked, "Does anyone have a suggestion about what else might reduce bullying at school?" with the following prompts: "What do others think of this suggestion?"; "Do others think this would reduce bullying at school?" and "Why do you think this would reduce bullying at school?". Responses referenced the architecture of schools, portable classrooms, and anti-bullying posters.
Cunningham et al. (2011)	Structural solutions to bullying: presence of surveillance cameras (monitoring playground, lunchroom and hallway), anti-bullying poster	Students chose between experimentally varied combinations of 14 four-level prevention program attributes (e.g., surveillance cameras, anti-bullying posters), with four levels representing increasing amounts of the attribute. Surveillance cameras: no cameras, cameras watch the playground, cameras watch playground and hallway, cameras watch playground, hallway and lunchroom. Anti-bullying posters: no anti-bullying posters in this school, posters show celebrities against bullying, posters show how bullying affects victims, posters show consequences for students who bully.
Fisher & Tanner-Smith (2016)	Presence of visible security measures: metal detectors and security cameras to monitor the school	Presence of visible security was measured with dichotomous student-reported items for: (a) metal detectors, (b) one or more security cameras to monitor the school.
Fram & Dickmann (2012)	"School built environment" described as: a combination of environmental and architectural changes. Built environment features included: Playground and hallways: security, lighting, size of space, undefined space (fencing), location in school (isolation)	Data collected using surveys and photographs of school's exterior and interior built environment (i.e., spaces and spatial features identified as potentially impacting safety and surveillance at the school) Open-ended survey questions were designed to uncover issues and perceptions of the school environment. Example questions: What kinds of threats to safety do you see at your school? Regarding safety policies and their

(continued on next page)

Table 3 (continued)

Author, year	Built environment feature	Built environment measure relevant to review
		procedures, what has been the greatest hindrance? Themes relative to safety, surveillance and bullying tendencies that emerged as central to interactions between the built environment and users of spaces included movement, security (e.g., “largeness of playground”), isolation (e.g., “weird design of buildings isolates rooms”, “not enough fencing around playground”), and lighting (“lack of lighting in playground”) and forms of discipline.
Haegele & Maher (2021)	Security cameras (or surveillance) in locker rooms	Semi-structured interviews with either students or parents included example probes (a) please describe what your experiences in physical education (PE) are like, (b) please describe your experiences with your peers during PE, and (c) how do your peers make you feel during PE? Bullying-related responses identified the lack of surveillance cameras in locker rooms.
Horton et al. (2020)	Spatiality and school design: structural elements (surveillance) and environmental elements (school size, architectural design and diversity of spaces).	Interview findings referred to size of schoolyard, crowding, diversity of school spaces, obstructive building design and natural elements.
Parrish et al. (2021)	Playground (markings, aesthetics, access with links to non-fixed equipment)	Interviews with children, teachers and principals focused on how children’s activity levels were influenced by: playground activity preferences, temperatures, other children and teachers, playground equipment, playground markings and playground aesthetics.
Richard et al. (2012)	School order: cleanliness (upkeep)	The variable clean school was obtained from factor analyses conducted on items answered by teachers. It was comprised of two items that measured teachers’ satisfaction with the cleanliness of their school e.g. ‘How satisfied are you with the upkeep and cleanliness of the school in general?’
Saldiraner & Gizir (2021)	Inadequate physical and social facilities	Data were collected from school principals using a semi-structured interview guide containing seven unspecified questions. Data were reduced into four major analytical categories: prevalent types of bullying, factors associated with bullying, strategies that principals take to tackle bullying in schools and issues principals faced while dealing with bullying in

Table 3 (continued)

Author, year	Built environment feature	Built environment measure relevant to review
Vilalta & Fondevila (2018)	School disorder: presence of graffiti, damage to walls, broken windows, dirt in school, dirt in neighbourhood	schools. School factors associated with bullying included inadequate physical and social facilities, such as limited numbers of gymnasiums, studios or workshops for visual arts, and music. The school vandalism measure combined student’s self-report of “have painted or damaged the school walls” and/or “have broken the school windows” at least once during the last year. (no, yes)
Wahab et al. (2018)	Territoriality: symbolisation and ownership (sculptures, school field, garden furniture, mural) Surveillance: (street layout, hidden corners, visibility of buildings, lighting, visibility of playground, school design, landscaping) Maintenance: (graffiti, litter, broken windows, and broken doors)	School level territoriality based on count of symbolisation and ownership elements (sculptures, school field, garden furniture, mural). School level surveillance based on observing elements of how buildings provide opportunities for students to bully, and identifying satisfaction with vision, including: hidden corners, visibility of one building from another, provision of lamps, visibility of school activity area, presence of CCTV, and design of building. School level maintenance based on observing elements of school disorder, including maintenance of planting/vegetation and buildings, graffiti, litter, broken windows, and broken doors.

and resources.

Eleven of the 19 studies that linked the school built environment to bullying behaviour reported school built environment features that may exacerbate bullying behaviour. Seven studies identified built environment features that may prevent bullying behaviour and seven studies identified built environment features that did not appear to be associated with bullying behaviour (Table 4). These features are described below.

**Table 4**  
School built environment features that potentially exacerbate or prevent bullying or fear of bullying victimisation.

Author, year	Factors exacerbating bullying behaviour	Factors preventing bullying behaviour	Neutral or no association with bullying behaviour
Bates et al. (2018)		<ul style="list-style-type: none"> <li>Renovated schoolyards (e.g., replacement of plain concrete with grass, soft-fall rubber, courts, pathways, garden beds, seating and new playground equipment).</li> </ul>	
Blosnich & Bossarte (2011)			<ul style="list-style-type: none"> <li>Security cameras</li> </ul>
Brewer et al. (2017); Brewer et al. (2018)	<ul style="list-style-type: none"> <li>Hate-related words or symbols written in school (e.g., graffiti)</li> </ul>	<ul style="list-style-type: none"> <li>Locked security doors/entrances during school</li> </ul>	
Broll & Lafferty (2018)			<ul style="list-style-type: none"> <li>Security cameras</li> </ul>
Chen & Chen (2018)		<ul style="list-style-type: none"> <li>Security cameras and security bells.</li> </ul>	<ul style="list-style-type: none"> <li>Classroom decorations with anti-bullying elements</li> <li>Bullying prevention brochures</li> <li>Anti-bullying slogans and posters</li> </ul>
Clarke (2018)		<ul style="list-style-type: none"> <li>Buddy benches</li> </ul>	
Craig & Pepler (1997)			<ul style="list-style-type: none"> <li>Proximity of bullying incident to closest building</li> </ul>
Craig et al. (2000)	<ul style="list-style-type: none"> <li>Limited space per capita</li> </ul>		
Cunningham et al. (2010)	<ul style="list-style-type: none"> <li>Portable classrooms "out of sight"</li> </ul>	<ul style="list-style-type: none"> <li>Anti-bullying posters</li> </ul>	<ul style="list-style-type: none"> <li>Anti-bullying posters</li> </ul>
Cunningham et al. (2011)		<ul style="list-style-type: none"> <li>Security cameras</li> <li>Anti-bullying posters depicting consequences for bullying perpetrators</li> </ul>	
Fisher & Tanner-Smith (2016)	<ul style="list-style-type: none"> <li>Metal detectors</li> <li>Security cameras</li> </ul>		
Fram & Dickmann (2012)	<ul style="list-style-type: none"> <li>Large playgrounds</li> <li>Inadequate fencing around playgrounds</li> <li>Insufficient lighting in carparks, building exteriors and hallways</li> <li>Large distances between school buildings and playgrounds</li> <li>Lack of windows facing playgrounds</li> <li>Long hallways</li> <li>Isolating building designs</li> </ul>		
Haegele & Maher (2021)	<ul style="list-style-type: none"> <li>Security cameras</li> <li>(Potentially) non-fixed play equipment (e.g., balls)</li> <li>Slippery mud</li> </ul>		
Horton et al. (2020)	<ul style="list-style-type: none"> <li>Visually restrictive or isolating playground and architectural design</li> <li>Non-spatially diverse playgrounds</li> <li>Competitive spaces (e.g. football courts)</li> </ul>		
Parrish et al. (2012)	<ul style="list-style-type: none"> <li>Limited space per capita</li> </ul>	<ul style="list-style-type: none"> <li>Non-fixed play equipment</li> </ul>	
Richard et al. (2012)			<ul style="list-style-type: none"> <li>School upkeep and cleanliness</li> </ul>
Saldiraner & Gizir (2021)	<ul style="list-style-type: none"> <li>Inadequate physical facilities (e.g., gymnasiums)</li> </ul>		
Vilalta & Fondevila (2018)	<ul style="list-style-type: none"> <li>Vandalism</li> </ul>		
Wahab et al. (2018)	<ul style="list-style-type: none"> <li>Scattered school blocks</li> <li>Low maintenance of school gazebos, pergolas, benches, garden tables, sign boards and flower pots</li> </ul>	<ul style="list-style-type: none"> <li>Permanent student artwork in interior spaces of buildings</li> </ul>	<ul style="list-style-type: none"> <li>Surveillance (e.g., sightlines affected by building and garden design, lighting, security cameras) design and placement of windows and building entrances)</li> </ul>

**3.4. School built environment features that potentially exacerbate bullying behaviour**

Of the 11 studies that identified school built environment features that may exacerbate bullying behaviour, four studies identified links between bullying and isolating building designs (Table 4). Cunningham et al.'s (2010) qualitative analysis of the bullying prevention and intervention recommendations of students in Grades 5 to 8 noted that spaces near portable classrooms were identified as bullying locations as they were rarely seen by teachers. Fram and Dickmann's (2012) examination of how the school built environment can exacerbate bullying and peer harassment in U.S. schools found that building design and hallway spaces often created isolated classrooms, which in addition to poor lighting, intensified bullying tendencies. Wahab and colleagues explored the contribution of building design on bullying behaviours in

secondary school students in Malaysia (Wahab et al., 2018). The authors noted that interactions between students during break times may be influenced by the arrangement of buildings on school sites and subsequent opportunities for adult supervision. A scattered building arrangement may impede supervision, while organised or compact building designs may facilitate supervision. Horton et al.'s (2020) qualitative study of teachers' perspectives on spatiality, school design, and bullying also found playground and building design can restrict teachers' views of spaces and, in turn, their ability to prevent bullying. This emphasis on supervision, visibility, and security was reflected in other studies linking bullying incidents to vandalism, absence of security cameras, unlocked security doors/entrances, presence of metal detectors, insufficient lighting, lack of windows facing playgrounds, long hallways, large playgrounds, inadequate fencing around play spaces, and large distances between buildings and playgrounds (Table 3).

Crowding and inadequate facilities were other themes that emerged from the review, with three studies attributing bullying incidents to limited space per capita and other studies to inadequate facilities such as gymnasiums, studios or workshops for visual arts and music; poor maintenance of existing facilities; non-spatially diverse playgrounds; and the presence of competitive spaces.

### 3.5. School built environment features that potentially prevent bullying behaviour

The seven studies addressing school built environment features that may prevent bullying behaviour identified the potentially protective features of security cameras and bells, non-fixed play equipment, permanent student artwork in interior spaces, buddy benches, anti-bullying posters, and a renovated schoolyard, with the renovation replacing concrete with grass, soft-fall rubber, new courts, and pathways.

Chen and Chen's (2018) investigation of teachers' perspectives on implementing and evaluating 21 anti-bullying strategies found that built environment features such as school safety facilities (i.e., surveillance cameras and security bells) were considered highly effective and highly implemented. Parrish et al. (2012) used interviews and peer pairs to understand how school environments in Australia affect young children's (grades 4–6) playground physical activity levels. Bullying was reportedly reduced when children had access to non-fixed equipment involving a ball, with students, teachers, and principals suggesting that non-fixed equipment created a more cohesive playground environment and prevented boredom and bullying. In a natural experiment, Bates et al. (2018) used a single group post-test-only design to examine the role of newly renovated green schoolyards in improving positive youth development outcomes, including teasing and bullying, in low-income urban students from the U.S. Interview findings indicated that staff perceived fewer teasing and bullying incidents in the post rather than pre-renovation schoolyard, with these effects maintained up to 32 months.

Cunningham et al. (2011) used a discrete choice conjoint experiment to model the bullying prevention recommendations of 845 students from grades 5 to 8 (aged 9–14 years) in Canada. Students chose between experimentally varied combinations of 14 four-level prevention program attributes (e.g., surveillance cameras, recess supervision, uniforms), with each level representing increasing amounts of the attribute. Using latent class analysis, students were grouped according to their preferred level of intervention across all 14 attributes and assigned to high (27.1%), moderate (49.5%) or low (23.4%) impact segments. Students in the high impact segment (i.e., those who preferred high levels of intervention overall) had the strongest preference for a bullying prevention plan that included surveillance cameras. Students in high and moderate segments thought that cameras monitoring playgrounds, hallways, and lunchrooms would reduce bullying, whereas students in the low impact segment preferred bullying prevention programs that did not include cameras. Notably, membership of the low impact segment was associated with involvement as a bully or bully victim, which may explain their aversion to the presence of security cameras. The high and moderate impacts segments also felt that posters depicting consequences for students who bully would be most effective, while the low impact segment recommended posters depicting the effect of bullying on victims. While this study reported student preferences for different levels of bullying prevention program attributes based on pre-determined hypothetical scenarios, the finding that more than 75% of the student sample believed that surveillance cameras and posters depicting consequences for bullying perpetrators should be included in bullying prevention programs suggests that Canadian students believe cameras and posters have the potential to reduce bullying behaviour in schools.

### 3.6. School built environment features reporting no association with bullying behaviour

Of the seven studies identifying built environment features that were not associated with bullying behaviour, two investigated security cameras and two investigated anti-bullying posters. Other built environment features reporting no association with bullying behaviour included the proximity of a bullying hotspot to the closest building, school maintenance and cleanliness, and classroom decorations with anti-bullying messages and bullying prevention brochures (Table 4).

Table 4 also highlights discrepant findings between studies. Fram and Dickmann (2012) found large distances between school buildings and playgrounds exacerbated bullying and peer harassment, while Craig and Pepler (1997) found most bullying incidents (68%) occurred within 120 feet of the school building. The perceived effectiveness of anti-bullying posters in preventing bullying was considered low by school staff (Chen and Chen, 2018), but varied between students (Cunningham et al., 2010). Some studies supported the presence of security cameras, with cameras identified as a highly effective (Chen and Chen, 2018) and highly preferred anti-bullying strategy (Cunningham et al., 2011). Similarly, the absence of security cameras was said to exacerbate bullying in locker rooms (Haeghele and Maher, 2021). However, other studies found the presence of security cameras was associated with higher odds of fearing victimisation (Fisher and Tanner-Smith, 2016), or reported no association between the presence of security cameras and bullying frequency (Broll and Lafferty, 2018) or the degree of peer victimisation (Blosnich and Bossarte, 2011).

## 4. Discussion

This scoping review identified 61 studies (63 articles) that explored the impact of the school built environment on bullying behaviour in school students. This appears to be the first review article published in a peer-reviewed journal to explore features of the school built environment and bullying. Studies included in this review identified school bullying locations ( $n = 43$ ) or linked a built environment feature of a school bullying location to bullying behaviour ( $n = 19$ ). Although this review identified built environment features that potentially exacerbated, prevented or showed no association with bullying behaviour, there is insufficient evidence to draw conclusions about the influence of the school built environment on bullying. Nonetheless, this review has provided useful insights into the potential impact of the school built environment on bullying, such as how students experience different locations within a school.

The classroom, playground, corridors, bathrooms, and lunchroom were identified as the five most frequent bullying locations within schools, suggesting they may be key settings for interventions, such as closer supervision, to reduce bullying behaviour. Frequent bullying locations may also differ according to the type of bullying observed or experienced. For example, Puhl and Luedicke (2012) found that weight-based victimisation occurred most frequently in the lunchroom for both boys and girls attending secondary school. Although some studies have explored school bullying locations according to physical, relational, and cyberbullying (e.g., Williford et al., 2018) or direct and indirect bullying (e.g., Craig et al., 2000), more research is needed to draw conclusions about the impact of different school locations on types of bullying, bullying behaviour (e.g., perpetrator of bullying, target of bullying, bully victim) and population subgroups. Craig et al.'s (2000) study of bullying in the playground and classroom found the type of bullying reflected the constraints of the context, with direct bullying more prevalent in the playground and indirect bullying more prevalent in the classroom. This may be due to more unstructured activities, higher activity levels, and reduced adult supervision in playgrounds than classrooms. Nonaggressive children were also more likely to bully others in the playground, while aggressive children were more likely to bully in the classroom. The authors posited that nonaggressive children

may participate in, or respond to, bullying incidents in playgrounds because of the unstructured playground environment, but that more aggressive children would bully in classrooms despite the increased structure and supervision. Although more male than female students were victimised in the classroom than playground, the proportion of episodes did not differ by gender across contexts for perpetrators of bullying, bully victims or students victimised in the playground (Craig et al., 2000). Fite et al. (2013) also noted that bullying is most likely to occur in large spaces with few rules, a high student-to-teacher ratio, and limited capacity for adult supervision. Other studies showed balls on the playground were implicated in bullying incidents, however it was the inappropriate use of this equipment that exacerbated bullying behaviour (Haegele and Maher, 2021). Indeed, bullying incidents are often precipitated by competition over scarce resources (Horton et al., 2020), lack of supervision, individual characteristics of the students involved, and poor adherence to school rules or policies. Thus, while this review has identified bullying locations and features of the school built environment that potentially impact bullying, it also suggests the role of the school built environment on bullying behaviour cannot be determined without considering interactions between the school's built environment and social environment (e.g., staff and student relations within bullying locations) and policy environment (e.g., rules and regulations). Thus, future systematic or scoping reviews may expand inclusion criteria to include features of the school social environment (e.g., crowding, adult supervision, school size, school climate) and policy environment (e.g., equipment and anti-bullying policies). Future studies might also explore outcomes that reflect the prevention of bullying, such as perceived safety, or broader indicators of fear of bullying, such as location avoidance.

Given many built environment features were linked to bullying via supervision and security in this review, potential mediators of the relationship between the built environment and bullying may be features associated with visibility, supervision, and safety. Although 19 studies explored potential relationships between the school built environment and bullying, there is still insufficient evidence to draw conclusions about the relative impact of different school built environment features on bullying behaviour. For example, the presence of security cameras was identified as a feature that may exacerbate, prevent, or show no association with bullying. Discrepant findings may be due to methodological differences given the studies in this review included different measures of the built environment and bullying, a range of data collection instruments, and study populations that differed in size, location, and status (i.e., students, staff members, and parents). The role of the school built environment on bullying is a new area of research with little evidence of overarching theoretical frameworks; for example, only one study referred to the term 'built environment' (Fram and Dickmann, 2012). While attempts to understand the relationship between the school built environment and bullying have gained momentum in recent years, consensus definitions and measures of the built environment would aid comparisons of study findings. A number of studies addressing school built environment features were also excluded from this review as there were insufficient data to draw conclusions about how the built environment impacted bullying. This was often because scales or interventions containing school built environment features were combined with non-built environment features. Future studies might consider creating separate school built environment scales or exploring the effectiveness of the built environment component of an anti-bullying intervention. Similarly, inconsistent response categories made it difficult to compare study findings and draw conclusions about the impact of demographic factors on bullying incidents in different locations. Age was reported as an age-range, a mean age, or a school grade level, depending on the study under review. Ages and grades of students attending different school levels (i.e., primary, middle, and secondary school) also varied both within and between countries. Gender was difficult to ascertain as many studies did not specify if they were measuring sex or gender, or alternatively, used sex and gender

interchangeably. Bullying outcomes also differed between studies; studies involving security cameras explored the frequency of bullying, type of bullying, severity of bullying, fear of bullying, and perceived effectiveness or preference for anti-bullying strategies. Lastly, study samples differed in size and school status. One study that found the presence of security cameras was associated with higher odds of fearing victimisation was based on a sample of 41,229 middle and secondary school students (Fisher and Tanner-Smith, 2016), while another study that found security cameras prevented bullying was based on the opinions of 538 school staff (Chen and Chen, 2018). Only one study reported longitudinal data linking the school built environment to bullying. A systematic review that includes a quality assessment of the literature is required to draw conclusions about effect sizes, direction of associations, and the quality of evidence. Having identified the presence of 61 studies in the published literature, this scoping review has provided evidence that a systematic review is warranted.

Systematic reviews are also needed to consider the relative importance of context when interpreting study findings. Perspectives around how the school built environment impacts bullying may vary between school staff and students, as well as between, and within, different schools and cultures. Additionally, as most of the studies included in this review were quantitative studies, qualitative research that contextualises bullying behaviour and addresses the influence of individual, social, policy, and built environmental factors on bullying and wellbeing is needed.

Finally, future studies could explore the relationship between bullying and Crime Prevention Through Environmental Design (CPTED) design principles. CPTED is a crime prevention strategy that promotes the design and use of built environments to reduce fear and crime and improve quality of life (Cozens and Love, 2015). CPTED design principles include natural surveillance; territoriality; access control; and maintenance and have been explored in school settings in relation to crime (Johnson, 2009; Wilcox et al., 2006). However, as bullying is distinct from crime, only two studies referencing CPTED principles met the inclusion criteria for this review (Fram and Dickmann, 2012; Wahab et al., 2018). Box 1 presents gaps and recommendations for future research.

#### 4.1. Limitations

This review is not without limitations. As the keyword 'built environment' is rarely used in the bullying literature, specific features of the school built environment were interpreted by the authors and included as individual keywords (see Appendix A). Although efforts were made to include terms specific to different countries, some built environment features may have been excluded. For example, hallways and corridors were identified as common bullying locations, however the term 'corridors' was not included as a keyword. The decision to exclude built environment features that are usually attached to a person, rather than within the school, was predicated on Williams et al.'s (2012) definition of the built environment as "anything made or modified by humans which is external to the individual but within the school boundaries" (p. 505). Smaller features of the built environment which were more likely to influence individuals than populations (e.g., vending machines) were excluded from the definition. However, in hindsight, school uniforms and security badges can affect the school community and are worthy of future consideration. Given the delay between the publication of this review and completion of the database search, another search of PsycINFO and ERIC databases was completed in September 2022 to identify relevant journal articles published since July 2021. Peer-reviewed journal articles were searched by title and abstract before full-text screening. Two new papers met the inclusion criteria (Bohnert et al., 2022; Waasdorp et al., 2022). One study exploring the effects of a green schoolyard renovation found caregivers, but not teachers, reported less bullying behaviour following the renovation (Bohnert et al., 2022). Another study found middle and high schools reporting increasing levels

**Box 1**

Gaps from the literature linking school built environments to bullying

- Consensus definitions and greater precision in measures of i) school built environment and ii) bullying.
- Longitudinal study designs to determine cause and effect.
- Rigorous experimental studies to identify school built environment strategies to prevent bullying.
- Large samples to generalise findings across schools and regions.
- Studies inclusive of multiple schools, including public and private school sectors.
- Varying study populations given the over-reliance on student self-reports (e.g., parents and school staff, including non-teaching staff such as school psychologists).
- Explorations of the relationship between the school built environment and bullying in diverse subgroups (e.g., different ethnic groups, grade levels, school levels, and genders, including LGBTQ + students).
- Qualitative studies that contextualise bullying behaviour and address the influence of individual, social, policy and built environmental factors on bullying and wellbeing.
- Potential pathways linking the school built environment to bullying, including the relative roles of visibility, supervision, policies and security measures.
- Potential pathways linking the school built environment to physical and mental health outcomes, and the potential mediating role of bullying.
- Ascertaining bullying severity to identify school bullying locations requiring greatest intervention.
- Evaluating school built environment components of anti-bullying interventions separately to the overall intervention.
- Investigations into CPTED design principles and bullying.
- Systematic reviews exploring the school built environment and bullying that also consider social environmental factors (e.g., crowding, supervision, school climate) and policy environmental factors (e.g., anti-bullying rules and regulations).

of physical comfort (i.e., cleanliness, maintenance, temperature, and bright and pleasant appearance) had greater odds of bullying defender behaviour (Waasdorp et al., 2022). These studies do not change the overall findings of this review but should be considered in future reviews on this topic.

Given the robust association between bullying behaviour and physical and mental health problems, designing school environments to prevent bullying behaviour has important health implications for children and adolescents (Casper and Card, 2017; Copeland et al., 2014; Gini et al., 2014; Moore et al., 2017). A meta-analysis exploring the consequences of bullying victimisation during childhood and adolescence found strong evidence of a causal relationship between bullying victimisation and mental health problems, such as depression, anxiety, poor general health and suicidal ideation and behaviours (Moore et al., 2017). Probable causal associations may also exist between bullying victimisation and tobacco and illicit drug use, with schools identified as important settings to implement effective interventions to address bullying behaviour (Moore et al., 2017). The current review has identified key bullying locations in schools that can be targeted when developing anti-bullying interventions, as well as specific design considerations when building new schools or retrofitting existing sites. Altering the school built environment is a population-level health intervention that has the potential to benefit all staff and students attending a school in any given year. As such, designing built environments to prevent bullying behaviour may be a cost-effective strategy to support bullying prevention efforts.

## 5. Conclusions

Investigations into how the school built environment influences bullying behaviour is a relatively new and complex area of research. This scoping review identified studies containing information about school bullying locations and features of those locations that potentially influence bullying behaviour. However, greater precision is needed when identifying where, why, how often and with whom bullying occurs in different school locations to effectively target built environment strategies and interventions to reduce or prevent bullying behaviour. Systematic reviews of the school built environment and bullying are warranted.

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## Data availability

Data will be made available on request.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.socscimed.2022.115451>.

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