

# Understanding the Relationship Between Nature and Physical Activity in Older Adolescent Girls: A Scoping Review

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DOI: <http://doi.org/10.15273/hpj.v2i2.11416>

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## Abstract

Adolescent girls are subjected to gender norms and stereotypes regarding their health and well-being. Research has indicated that women and girls are exposed to unrealistic and unattainable body ideals that affect their relationship with physical activity (PA). In addition, despite suggestions that nature is important for health and well-being, women and girls experience barriers in accessing and connecting with nature due to gender expectations and stereotypes. The purpose of this review is to determine what is known from the existing literature about older adolescent girls' relationship with nature and PA. This scoping review follows the framework of Arksey and O'Malley. In total, 39 studies were reviewed, and their characteristics were summarized quantitatively and qualitatively. Five themes were identified: (a) Active transportation provides an opportunity for girls to connect PA with nature, (b) Adolescent girls' navigation of gender norms and barriers while connecting with PA and nature, (c) Perceived safety influences adolescent girls' relationship with PA and nature, (d) Infrastructure and aesthetics can impact adolescent girls' connection between PA and nature, and (e) The relationship between PA and nature intersects with girls' mental well-being. Gaps in the literature are identified and discussed. It is concluded that older adolescent girls' relationship with nature and PA is influenced by gender norms and perceptions of aspects of their environment, such as safety and aesthetics.

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## Introduction

Physical inactivity has been identified by the World Health Organization (WHO) as a worldwide problem and one of the leading risk factors for global mortality (WHO, 2020). As youth age, their levels of physical activity (PA) decrease, and adolescent girls between the ages of nine and 19 are the most susceptible to this

decline, as their PA levels descend by approximately 83% (Dwyer et al., 2006; Guthold et al., 2020; ParticipACTION, 2020; Russell et al., 2008; WHO, 2020). Further, in Canada, only 2% of girls aged 12–17 meet movement guidelines (Colley et al., 2017; Guthold et al., 2018; ParticipACTION, 2020; WHO, 2020). As young girls mature into adolescents, they are faced with numerous challenges, contradictions, and

double standards regarding their bodies (Spencer et al., 2021). It is therefore not surprising that women and girls have a complex relationship with PA due to the need to navigate gender norms and stereotypes (Beltrán-Carrillo et al., 2018; Dwyer et al., 2006; Lee & Macdonald, 2010; Rosselli et al., 2020; Wesely & Gaarder, 2004).

At a young age, girls can be impacted by media platforms and images centred around gender norms that promote unrealistic standards about what it means to identify as a girl. For example, the media can influence girls to assume they need to be thin, slender, and pretty (Beltrán-Carrillo et al., 2018; Rosselli et al., 2020). Misogynistic stereotypes and norms sometimes value certain traits in girls and women such as being carefully groomed, compliant, sweet, pleasant, co-operative, upbeat, and polite (Whittington, 2006). Stereotypes and norms can also extend to how girls should dress, speak, and pursue interests (Beltrán-Carrillo et al., 2018; Lee & Macdonald, 2010; Rosselli et al., 2020). The pressure to adhere to these norms can impact adolescent girls' experiences with PA. For example, traditional stereotypes position PA as masculine (Warren, 2015; Whittington, 2006), resulting in contradictions between typical standards of femininity and PA (Beltrán-Carrillo et al., 2018; Dwyer et al., 2006; Lee & Macdonald, 2010; Rosselli et al., 2020; Wesely & Gaarder, 2004). Further, the pressure to adhere to specific feminine standards, such as to be pretty and thin, can lead adolescent girls to avoid participating in PA due to fear of being criticized or being perceived as too masculine by their peers (Beltrán-Carrillo et al., 2018; Dwyer et al., 2006; Lee & Macdonald, 2010; Rosselli et al., 2020; Wesely & Gaarder, 2004).

Girls' experiences in nature are often affected by constraining social norms about what girls can and cannot, or should and should not, do in nature (Brussoni et al., 2020; Lee et al., 2015; Marzi et al., 2018; McAnirlin & Maddox, 2020). Traditional gender norms suggest that

women and girls should be warm, sensitive, and co-operative, be attractive, be thin, nurture others, be silent, defer to men, and avoid dominance, just to name a few (Kavasoglu & Yaşar, 2016; Metcalfe, 2018; Prentice & Carranza, 2002; Rudman et al., 2012). This focus on girls and their aesthetic hinders their potential to be physically athletic and active (Metcalfe, 2018). The belief and attitude that some nature activities, such as scouting, hunting, and hiking, are not appropriate for girls perpetuates the lack of support that girls receive to engage in nature activities (Ghimire et al., 2014; Henderson & Shaw, 2006; Lee et al., 2015). These gender stereotypes can result in confusing messages and narratives for girls and women concerning PA and nature.

Nature and PA stereotypes do not promote adolescent girls' PA and outdoor pursuits. Over the past decade, it has been found that adolescents have been spending less time outside, specifically older adolescent girls (Larson et al., 2011; McNiel et al., 2012; Roth & Basow, 2004). The stereotype that nature is a masculine domain reinforces the idea that outside spaces are not for girls, leading girls to limit their connections between PA and nature (Hively & El-Alayli, 2014; McNiel et al., 2012). When girls do connect with PA and nature, they may face a complex dilemma of resisting oppressive stereotypes of femininity while also trying to conform to traditional gender norms (Lugg, 2003). When girls challenge assumptions about their abilities, appearance, and behaviours, they disrupt misogyny (McNiel et al., 2012; Whittington, 2006; Wittmer, 2001). Social and cultural norms can impact adolescent girls' relationships with nature and PA.

The relationship older adolescent girls have with PA has been under-explored, as most of the PA literature is focused on early-to-middle adolescents (Richman & Shaffer, 2000; Spencer et al., 2015). This gap is necessary to fill as older adolescent girls become more sedentary and less active as they age (Guthold et al., 2020; ParticipleACTION, 2020). In addition, there has

been limited research on the relationship girls form with nature and PA (Evans, 2006; Gray et al., 2015; White et al., 2019). This is a critical gap to address, as the stereotypes and gender norms older girls face may be impacting their well-being and their ability to form a relationship with nature and PA.

The purpose of this scoping review is to determine what is known from the existing literature about older adolescent girls' relationship with nature and PA. For this review, older adolescent girls are defined as girls and young women between the ages of 16 and 19, in accordance with WHO (2020). The gender terms "women" or "girls" will be used in this study, as gender refers to socially constructed characteristics of behaviours and roles associated with self-representation, such as being a girl or boy. PA will be broadly defined as a wide range of activities that require movement produced by skeletal muscles, such as walking, cycling, sports, and recreation (WHO, 2018, 2020). Humans can interact with nature in many different ways, through spending time outdoors in built environments or undeveloped environments containing natural vegetation (MacBride-Stewart et al., 2016). The term nature describes the natural environment, developed or undeveloped, green or blue space, or landscape that includes plants and wildlife (Centers for Disease Control and Prevention, 2009). These spaces can include parks, forests, and playing fields, where outdoor recreation, sports, and activities occur (Britton et al., 2020; Völker & Kistemann, 2011). Nature can be seen as an open and constantly changing environment, where it is possible to experience freedom, active movements, and contact with

natural elements (Bilton, 2010; Dymont & Bell, 2008; Hunter et al., 2016).

## Objectives

This review will take the approach of a scoping study using the methods of Arksey and O'Malley (2005). Scoping reviews are used to examine a broad range of literature while focusing on breadth instead of depth (Arksey & O'Malley, 2005; Munn et al., 2018; Pham et al., 2014). This review will apply the five-stage framework proposed by Arksey and O'Malley (2005), which includes defining the research question; identifying relevant studies; study selection; charting the data; and collecting, summarizing, and reporting the results. The research question for this review is as follows: What is known from the existing literature about older adolescent girls' relationship with nature and PA?

## Methods

### Identifying Studies

The search strategy was developed in consultation with a subject specialist health librarian. Guided by the research question, a list of key search concepts was developed: adolescent girls, nature, and PA. The electronic databases Academic Search Premier, CINAHL, Gender Studies Database, APA PsycInfo, SPORTDiscus, and PubMed were used for this search. Our keyword search strategy (Table 1) for all databases included key terms centred around "adolescent girls" or "women," "physical activity" or "exercise," and the "outdoors" or "nature." Additionally, database-specific subject headings were used, such as "movement," "recreation," or "sports." Articles were imported

**Table 1**

*Keyword Search Strategy*

<b>Key search term 1</b>	(adolescen* or teen* or youth* or young*) N3 (women or woman or girl* or female*)
<b>Key search term 2</b>	(physical* N2 (activ* or fit*)) OR exercis*
<b>Key search term 3</b>	outdoor* or outside or natur* or (green N2 spac*)
<b>Final search terms</b>	1 AND 2 AND 3

**Table 2**

*Inclusion and Exclusion*

<b>Criteria</b>	<b>Inclusion</b>	<b>Exclusion</b>
<b>Location</b>	Worldwide	
<b>Gender</b>	Adolescent girls or young women	Adolescent boys or young men
<b>Focus</b>	Girls' connection to nature through physical activity	Indoor PA or boys' connection to nature and/or physical activity
<b>Age</b>	Primary participants aged 16–19 (with larger ranges included if relevant results could be identified)	Primary participants aged outside 16–19
<b>Language</b>	English	Any language other than English
<b>Publication type</b>	Peer-reviewed original research	Publications that did not report on original research, such as reviews, discussion papers, book reviews, conference proceedings, and dissertations
<b>Publication date</b>	2008–June 2022	Prior to 2008

to Covidence, a software that allowed the first and second authors to screen each study. Each study was screened using the inclusion and exclusion criteria described in Table 2 (Arksey & O'Malley, 2005). Appendix B contains a sample search strategy from APA PsycInfo database.

**Inclusion and Exclusion Criteria**

This review included studies published between 2008 and June 2022 (when the search was conducted) that discussed adolescent girls' or young women's relationship with PA and nature. We selected 2008 as a relevant time frame because in 2008 the WHO produced the first set of international estimates on insufficient PA, providing the first compilation of global data on the prevalence of insufficient physical activity (Guthold et al., 2018). Gender as an inclusion criterion for this study included feminine identities, such as women and girls. As gender is a socially-constructed self-representation, participants who self-identified as a women or girl were taken into consideration. Studies with mixed genders were

included if we could isolate the relevant findings specific to women and girls. In addition, articles were included if the primary participants were aged 16–19, as this is the age range the WHO used to define older adolescent girls. Articles with a larger age range were included if findings specific to the age range of 16–19 could be isolated. A preliminary search was conducted prior to this review to ensure that no duplicative evidence syntheses have been previously done. Reviews were excluded to focus on primary sources; however, during full text review the reference lists of any notable reviews were scanned for relevant articles, though no additional articles were added this way. A preliminary scan of the grey literature did not result in additional sources. Studies were first screened based on title and abstract using Covidence. During the full-text review, articles were screened by the first and second authors, while the third author assisted in resolving conflicts.

We used Arksey and O'Malley's (2005) descriptive-analytical approach to

systematically extract and chart data from the studies that met the inclusion criteria. Data were interpreted and synthesized through charting using Microsoft Excel by the first author and then reviewed and refined by the last author. Study characteristics that were charted included the following: author(s), publication year and location, study purpose, methods, design, population, key findings, and conclusions (Levac et al., 2010). Results were summarized in order to present an overview of the evidence (Appendix A; Arksey & O'Malley, 2005). Appendix A summarizes study characteristics such as authors, year, and country; objective/aim; population; design: methodology; and study findings.

Themes were developed iteratively by the first author using guidance from the Braun and Clarke method for reflexive thematic analysis, and later reviewed by the last author (Arksey & O'Malley, 2005; Braun & Clarke, 2006, 2019, 2021). Reflexive thematic analysis involves systematically exploring, interpreting, and reporting patterns from the data set (Braun & Clarke, 2019, 2021). First, the authors familiarized themselves with the data set, where they read the included studies and created the chart to become immersed in and familiar with the content (Arksey & O'Malley, 2005; Braun & Clarke, 2019). We then coded the data by reviewing the chart and systematically generating and applying labels to identify concepts and trends that help address the research question (Braun & Clarke, 2019). Then, we examined the codes to explore patterns leading to potential themes (Braun & Clarke, 2019). All authors came together to discuss and refine potential themes as they developed (Braun & Clarke, 2019). We considered our positions reflexively throughout this process, reflecting on our own positions, education, and upbringing and remaining mindful of them through our analysis.

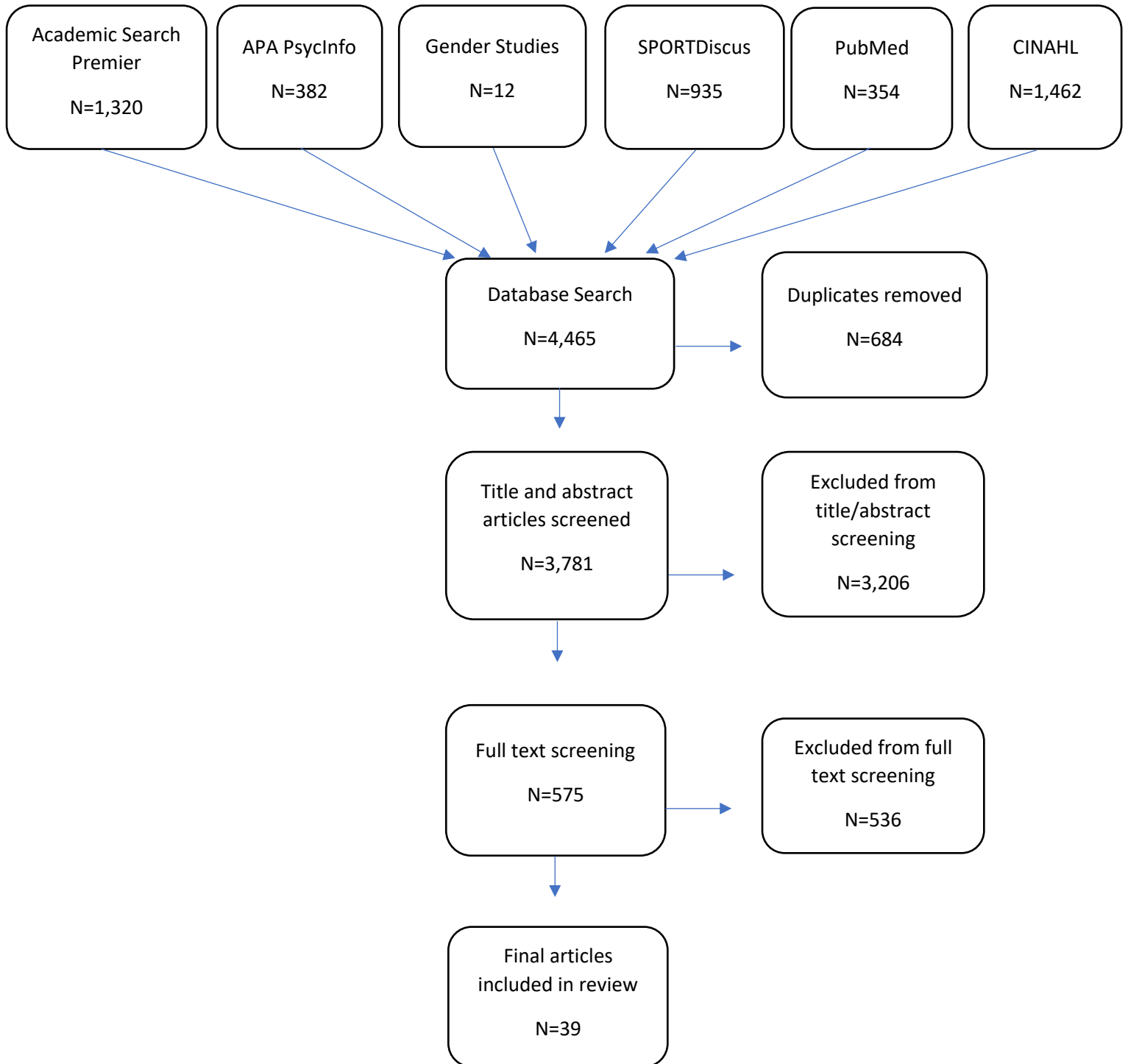
## Results

### Search Outcome

The database search was originally executed in February 2021, resulting in 4,465 studies being identified; 684 duplicates were removed, resulting in a total of 3,781 studies to be screened. Following the title and abstract screening, 3,206 studies were excluded leaving 575 studies to full-text screen. During full-text screening, 536 studies were excluded, leaving 39 for inclusion in this scoping review. The search was run again in June 2022 with no additional articles identified for inclusion (200 articles identified, 15 full-text reviews, no new articles added). Figure 1 further describes this process.

Of the 39 articles that met the study inclusion criteria, 15 were published between 2008 and 2012, 12 between 2013 and 2017, and 12 in the last four years. The reviewed articles were relatively evenly distributed throughout the years, indicating that the concepts of nature and PA have been proportionally researched over time. North America reported the greatest number of articles (19), followed by Europe (10), South America (six), and Asia (two). There was one article from Australia and one from New Zealand. The settings of reviewed articles included parks (nine), neighbourhoods (six), schools (nine), and open spaces (six), while others did not specify (nine). Quantitative designs were the main form of data collection (30), followed by qualitative (six) and mixed methods approaches (three). Self-reported data was the primary form of data collection for quantitative studies, as the majority used surveys, questionnaires, or scales (19). Secondary analysis was also used commonly in quantitative studies (nine). A range of additional quantitative measures were used, including anthropometric measures (four), fitness testing (four), pedometers (one), accelerometers (one), and observations (eight). The primary data collection method for qualitative and mixed methods studies were interviews or focus

**Figure 1**  
*Search Outcome*



groups (seven). One study used photovoice.

While this scoping review’s intended participant age range was older adolescent girls aged 16–19, only two articles were focused on this specific age range. Articles that included a broader age range were included if findings specifically relevant to our age of interest could be isolated. Most included articles contained adolescents between the ages of 12–17 or had a broader range, such as 9–18 or 18+; however, they had smaller age brackets for reporting,

such that we could isolate findings relevant to our population of interest. Additionally, most studies (36) included multiple genders, with only three studies focusing on girls or women specifically. Studies with mixed genders were also only included if we could isolate findings specific to our population of interest. Table 3 summarizes the characteristics of reviewed studies.

**Table 3**

*Study Characteristics*

<b>Methodology</b>	Qualitative	6
	Quantitative	30
	Mixed	3
<b>Year Published</b>	2008–2012	15
	2013–2017	12
	2018–2021	12
<b>Setting</b>	Neighbourhood	6
	Park	9
	Open Space	6
	School	9
	Not Specified	9
<b>Location</b>	North America	19
	South America	6
	Europe	10
	Asia	2
	Australia	1
	New Zealand	1

**Themes Identified**

Five themes were identified through conducting reflexive thematic analysis of the charted data. First, active transportation can provide girls with an opportunity to connect PA with nature. Second, aspects of PA in nature can help girls navigate gender norms. Third, adolescent girls’ perceived safety can influence their relationship with PA and nature. Fourth, adolescent girls’ connection between PA and nature is impacted by infrastructure and

aesthetics. Finally, PA and nature can have an effect on adolescent girls’ mental well-being. Active Transportation Provides an Opportunity for Girls to Connect Nature With PA

Many reviewed studies emphasized active transportation as a common form of PA that connects adolescent girls to nature. Studies indicated walking and biking as the primary forms of active transportation for girls (Boone-Heinonen et al., 2010; Chillón et al., 2013; Janha et al., 2020; Nelson et al., 2008; Ramírez-Vélez et al., 2017; Thomas, 2015; Ward et al., 2018). One

study found that cycling as a form of active transport helped girls incorporate natural environments into their daily routines (Thomas, 2015). Additionally, researchers found that, while using active transportation, aspects of nature such as vegetation provided girls with familiarity, reassurance, and comfort (Boone-Heinonen et al., 2010; Janha et al., 2020; Thomas, 2015). Further, studies found that active transportation also resulted in girls feeling more connected to nature, as they could reflect and reconnect with their surroundings and themselves (Janha et al., 2020; Thomas, 2015). Several studies noted that girls associate active transportation with well-being, as they can socialize in natural environments while engaging in PA (Dunton et al., 2010; Kudlacek et al., 2020; Ries et al., 2008; Ward et al., 2018). Additionally, researchers found that having peer support while using active transportation encouraged girls to spend more time in natural environments and facilitated more time for PA (Chillón et al., 2013; Dunton et al., 2010). In addition, researchers found that when girls use active transportation, they are able to engage in PA while connecting with nature (Chillón et al., 2010; Martínez-Gómez et al., 2011; Ramírez-Vélez et al., 2017).

### ***Girls Have to Navigate Gender Norms to Connect PA and Nature***

Reviewed articles discuss gender-specific challenges related to nature and PA. Studies highlighted challenges that can impact adolescent girls' connection with PA and nature, such as school uniforms, skirts, footwear, and cultural pieces, as these items may make it difficult for girls to use active transportation or participate in outdoor activities (Rothe et al., 2010; Ward et al., 2018). Several studies indicated that girls reported prioritizing studying, chores, babysitting, or other jobs as they aged, which led to less time available for PA and exploring natural environments (Janha et al., 2020; Rothe et al., 2010; Tannehill et al., 2015). Further, researchers found that expenses

such as transportation fees and outdoor clothing resulted in girls choosing to participate in indoor activities, at facilities close to their homes, or at home (Humbert et al., 2008; Rothe et al., 2010). Several articles discussed how sports facilities, parks, and open spaces tend to be dominated by men, which can result in girls feeling intimidated or unwelcome (Babey et al., 2015; Dias et al., 2019; Floyd et al., 2011; Kudlacek et al., 2020; Ries et al., 2008; Spencer et al., 2021; Van Hecke et al., 2018).

Although women and girls may face gender-specific challenges in connecting PA and nature, some aspects of nature were found to help girls navigate these gender norms. For example, Spencer et al. (2021) found that being outside in nature provided adolescent girls with a positive environment to navigate gender norms and stereotypes regarding their health. Researchers also found that social and emotional support from family and friends gives girls the ability to navigate gender norms, such as those relating to PA and nature (Chillón et al., 2013; Dunton et al., 2010; Spencer et al., 2021). Further, researchers found that girls are more open to challenging gender norms when they are with friends, as they feel less vulnerable performing activities in nature with the support of their friends (Janha et al., 2020; Kudlacek et al., 2020; Tannehill et al., 2015).

### ***Perceived Safety Influences Adolescent Girls' Relationship With PA and Nature***

Many of the reviewed studies noted the critical role perceived safety and security plays in girls' connection between nature and PA. Studies indicated that perceptions of park safety and park accessibility are important predictors of engaging in park-based PA among adolescent girls (Babey et al., 2015; Humbert et al., 2008; Ries et al., 2008). Researchers also noted that road safety and accessibility issues, such as inadequate crosswalks, sidewalks, and bike lanes, were associated with avoidance of parks, facilities, open spaces, and active transportation (Boone-Heinonen et al., 2010; Carver et al.,



2012; Dias et al., 2019; Humbert et al., 2008; Oliveira et al., 2020; Rothe et al., 2010; Schultz et al., 2017). In addition, researchers suggested that parents' perception of neighbourhood safety, such as low traffic and crime rate, increases the likelihood of girls' outdoor PA (Oliveira et al., 2020; Perez et al., 2017).

Parental perceived risk was highlighted as a significant influence on adolescent girls' ability to form a relationship with nature and PA. Several studies indicated that parents perceive their daughters to be at risk of harm, especially in outdoor settings (Carver et al., 2012; Ding et al., 2012; Perez et al., 2017). Researchers suggested that when parental perceived risk is high, adolescent girls' opportunities to connect PA and nature are limited (Carver et al., 2012; Ding et al., 2012; Perez et al., 2017). Further, studies found that perceived risk significantly affects girls' PA, as girls who have high levels of fear or are exposed to crime within their neighbourhood were less likely to engage in outdoor PA and felt unsafe using active transportation (Chaparro et al., 2019; Ding et al., 2012; Perez et al., 2017; Rišová & Sládeková Madajová, 2020; Roman et al., 2013). In addition, one study found that the pursuit of independent activity, such as walking or hiking, could be limited as travelling alone presents a challenge to adolescent girls (Spencer et al., 2021).

### ***Infrastructure and Aesthetics Impacts Adolescent Girls' Connection Between PA and Nature***

Reviewed studies identified specific factors such as proximity, characteristics of facilities, and environmental aesthetics as influencing girls' connection between nature and PA. For example, several studies indicated that neighbourhoods with access to parks were associated with increased PA in girls, as they have more options close by (Babey et al., 2015; Humbert et al., 2008; Mitra et al., 2020; Oliveira et al., 2020; Schultz et al., 2017). Other studies found that built environments consisting of

multiple facilities, such as PA clubs, courts, playgrounds, swimming pools, open fields, trails, and tracks, result in a higher percentage of adolescent girls participating in PA (Cohen et al., 2017; Dunton et al., 2010; Floyd et al., 2011; Hunter et al., 2016; Kaczynski et al., 2011; Ries et al., 2008; Sarmiento et al., 2017; Van Hecke et al., 2018). Studies found that when natural environments can support a variety of ages, PA levels increase across age groups, including for adolescent girls (de Paula da Silva et al., 2019; Kaczynski et al., 2011; Thomas, 2015; Van Hecke et al., 2018). In addition, studies indicated that the aesthetics of the park or the natural environment, along with the park's facilities, could enhance PA (Cohen et al., 2017; Floyd et al., 2011; Reed et al., 2012; Ries et al., 2008; Wilhelm Stanis et al., 2014).

The aesthetics of natural environments was highlighted as a significant influence on adolescent girls' PA. Two studies noted that when a natural environment is aesthetically pleasing, older adolescent girls are more likely to visit these spaces, connect with their surroundings, and engage in PA (Oliveira et al., 2020; Roman et al., 2013). Additionally, studies indicated that girls are more likely to visit parks and outdoor areas that contain flowers and trees, as they associate nature with beauty, scenery, colour, and views (Ries et al., 2008; Shan, 2014; Spencer et al., 2021). Reviewed articles also noted that girls describe the aesthetics of their natural environments through language centred around positivity and health (Shan, 2014; Thomas, 2015). Other studies found that natural environments provided girls with a place to engage in PA, reflect, and connect with their surroundings (Shan, 2014; Spencer et al., 2021; Thomas, 2015). Finally, studies suggested that some girls connected being outside in nature directly to PA, while others connect nature more broadly to well-being, which may include PA (Spencer et al., 2021; Thomas, 2015).

### ***The Relationship Between Nature and PA Intersects with Girls' Mental Well-Being***

Adolescent girls also relate the natural environment to their mental well-being and PA. Several studies indicated that natural environments or spaces can positively influence mental health and well-being, especially when connected with PA (Bojorquez & Ojeda-Revah, 2018; Cobar et al., 2017; Shan, 2014; Tannehill et al., 2015; Thomas, 2015). Reviewed studies found that girls emphasize the importance of being outside to get fresh air, enjoy the surroundings, clear their heads, express emotions, and engage in PA (Tannehill et al., 2015; Thomas, 2015). Further, studies identified that walking in parks or green spaces improved mental health in women, especially younger women and adolescent girls (Bojorquez & Ojeda-Revah, 2018; Cobar et al., 2017). Other studies described natural green spaces as therapeutic, as they were found to help girls restore their well-being and engage in PA (Cobar et al., 2017; Tannehill et al., 2015; Thomas, 2015).

Girls are more inclined to engage in PA when they are in a familiar and comfortable atmosphere. Studies noted that natural environments that had a comfortable atmosphere provided girls with feelings of fulfillment, accomplishment, reassurance, and comfort, leading them to express emotions, connect with their mental well-being, and participate in PA (Bojorquez & Ojeda-Revah, 2018; Tannehill et al., 2015; Thomas, 2015). In addition, studies found that participating in activities in natural spaces played a role in stress and anxiety reduction, and improved attention restoration and mindfulness (Cobar et al., 2017; Tannehill et al., 2015; Thomas, 2015). Studies found that when natural environments provided adolescent girls with familiarity and comfort, they were able to focus on their well-being and were more inclined to engage in PA (Tannehill et al., 2015; Thomas, 2015). Overall, researchers highlighted that girls' well-being can be improved through visiting natural

environments that provide a comfortable atmosphere, as they allow girls to perform PA, reflect, and reconnect with themselves (Bojorquez & Ojeda-Revah, 2018; Shan, 2014; Tannehill et al., 2015; Thomas, 2015).

### **Discussion**

This scoping study reviewed 39 articles exploring older adolescent girls' relationship with nature and PA. Five themes were developed through reviewing the existing literature. Themes focused on how adolescent girls' relationship with nature and PA can be influenced by active transportation, gender norms, perceived safety, infrastructure and aesthetics of natural environments, and mental well-being. Themes detail adolescent girls' experiences with PA and nature, including the barriers they face and the benefits associated with PA and the outdoors. The themes identified in this study are interrelated, align with the broader literature, and provide new insight into adolescent girls' relationship with PA and nature. This review contributes to the literature by summarizing what is known about adolescent girls' relationship with PA and nature for the first time.

The themes in this review are distinct but deeply intertwined in instances. For example, the theme of mental well-being intersects with the themes related to the impact of gender norms, the influence of environment aesthetics, and the effect of infrastructure on adolescent girls' well-being and their connection between PA and nature. Further, the influence of peers and family on adolescent girls' relationship with nature and PA was apparent across the first and second themes, as social and emotional support from family and friends is important for girls' relationship with nature and PA. These findings align with previous research that indicates the importance of social support for PA, especially for girls (Allison et al., 2005; Brockman et al., 2011; Laird et al., 2016). Findings that align with the literature provide a

stronger evidence base for emerging information on girls' relationship with nature and PA.

Another theme well aligned with other literature was the association between mental well-being and the connection between PA and nature. For instance, much of the current literature suggest that natural environments are essential for releasing stress and promoting relaxation (Birch et al., 2020; Bojner Horwitz et al., 2020; Cheesbrough et al., 2019; Hammer et al., 2013). Previous research has suggested that when people have the opportunity to visit natural environments they are able to better cope with various life challenges (Degenhardt & Buchecker, 2012; Korpela & Ylén, 2009). The studies in this review are in keeping with the literature, while also providing new insight by further highlighting women and girls' connection with mental well-being in nature settings.

Themes connecting well-being and gender norms are also consistent with the broader literature. For example, previous studies suggest that young girls' PA can be limited due to the opportunities available to them and by the complex gender expectations of society (Coleman et al., 2008; Cowley et al., 2021; Rogers & Rose, 2019; Spencer et al., 2015; The Lancet Public Health, 2019; Warren, 2015). While these publications have begun to identify that girls' connection with PA and nature is influenced by gender norms, the overall relationship between PA and nature has not been previously reported. Findings from this review further highlight how gender norms can affect how girls are able to form a relationship with PA and nature, which influences their overall well-being.

This review identified that perceived safety of an environment can affect older adolescent girls' connection between nature and PA. These findings align with literature that suggests girls feel unsafe in natural environments due to fears of harassment, leading them to refrain from connecting with PA

and nature (Dunton et al., 2010; Kilgour & Parker, 2013; Plane & Klodawsky, 2013). Additionally, previous literature suggests that fear of harassment can deter women and girls from using active transport (Gekoski et al., 2017; Iqbal et al., 2020; Phadke, 2013); however, many studies in this review emphasized active transportation as an important form of PA that connects adolescent girls to nature. The findings from this study contrast previous literature by revealing how girls use active transportation to connect with nature.

### **Gaps in the Literature and Suggestions for Future Research**

As is common in scoping reviews (Arksey & O'Malley, 2005), this study helps identify several gaps in the literature. First, reviewed studies focused primarily on early-middle adolescents (10–16 years) or women (18+ years), while very few specifically focused on older adolescent girls (16–19 years). This is common in much of the PA literature, where studies tend to focus on early-middle adolescents or older adults (Richman & Shaffer, 2000; Spencer et al., 2015). This offers an interesting opportunity for future research addressing this population, as girls in the older adolescent age group may have unique experiences and perspectives given the gender norms they face and their relationship with PA and nature (Rosselli et al., 2020).

In terms of methodology, most of the articles included in this review used a quantitative approach, which, while appropriate for measuring PA, may not provide a comprehensive understanding of adolescent girls' experiences and perceptions (Curry et al., 2009). Future research should utilize qualitative methodologies and/or creative, participatory, visual, or arts-based methodologies to gain valuable insight regarding the lived experiences of older adolescent girls and how they perceive the relationship between nature and PA (Dunn & Mellor, 2017).

A significant gap in the literature is that studies often focus on PA that takes place outside, with little emphasis on analyzing the connection between adolescent girls' PA and nature. Of the 39 peer-reviewed research articles reviewed, only seven explicitly focused on the connection or relationship between nature and PA. Further, there was a substantial focus on PA rather than nature. Most of the reviewed articles focused on PA with nature either mentioned (10) or as an underlying concept (eight). Lastly, just four publications focused on women and girl participants specifically, without comparison to men. In other publications, either women and girls were directly compared to men or gender was only briefly mentioned in the analysis. Studies should refrain from simply comparing women and girls to men and boys, and should recognize the importance of the specific experiences of historically marginalized gender identities (Tannenbaum et al., 2016). Further, there are additional gender identities that have faced more problematic historical marginalization and warrant future research as well. As little research explicitly examined older adolescent girls' relationship with nature and PA, there is an opportunity for future research to explore adolescent girls' relationship with PA and nature.

### **Strengths and Limitations**

One of the review's strengths is that we employed a comprehensive search strategy resulting in the inclusion of a variety of studies focused on nature, adolescents, and PA. The Arksey and O'Malley (2005) framework was used to strengthen the process of identifying, extracting, and analyzing publications for this review. Another strength of this review is that it allowed us to identify gaps in the existing literature that can be used to guide future research. Finally, this work was conducted by a team of researchers with expertise in scoping reviews and gender research.

A potential weakness of scoping reviews is that they focus on breadth rather than depth, resulting in a lack of quality assessment (Arksey & O'Malley, 2005; Levac et al., 2010). Although scoping reviews aim to conduct an extensive and comprehensive search on a specific topic, this is not always possible, resulting in the likely exclusion of some relevant studies (Anderson et al., 2008; Arksey & O'Malley, 2005; Brien et al., 2010; Levac et al., 2010; Pham et al., 2014). A potential limitation of this review is that, given the focus on girls between the range of 16–19, articles that have a broader age range or did not specifically indicate their age range were excluded. In addition, the review was limited to articles published in English and did not explore grey or unpublished literature, although we recognize they constitute an important source of information. Finally, the exclusion and inclusion criteria used in the study selection reflects our subjectivity, which influenced our decision-making when deciding which articles are relevant for this review.

### **Conclusion**

In conclusion, this scoping review has summarized what is known from the existing literature about older adolescent girls' relationship with nature and PA. The results of this review emphasize that active transportation, social and emotional support, perceived safety, gender norms and barriers, and aesthetics are factors that impact adolescent girls' relationship with nature and PA. While there appears to be many ways for adolescent girls to form a relationship with nature and PA, they may also experience gender norms and stereotypes that influence their engagement with nature and PA, which requires further investigation. There is a need for research focusing on older adolescent girls, exploring the relationship between PA and nature, while employing a qualitative methodology. Future research should utilize qualitative methodologies and/or creative, participatory,

visual, or arts-based methodologies and explore additional gender identities. As little research explicitly examined older adolescent girls' relationship with nature and PA, there is an opportunity for future research to explore older adolescent girls' perspectives of their relationship with nature and PA in more depth.

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## Appendix A

### Summary of Charting Process

Authors (Year); Country	Objective/Aim	Population	Design: Methodology	Study Findings
<b>Babey, Tan, Wolstein, Diamant (2015); USA</b>	To examine how adolescents' sociodemographic, family, and neighbourhood characteristics influence their park-based PA.	3,638 participants; 1,823 girls Age 12–17	Quantitative. The data was obtained from the 2007 California Health Interview Survey and adolescents' demographics of park-based PA.	Park availability and perceptions of park safety are important predictors of engaging in park-based PA among adolescents, especially women.
<b>Bojorquez, Ojeda-Revah (2018); Mexico</b>	To explore the association between public park green coverage and mental health in women.	2,345 women participants; Age 18–65	Quantitative. Data was obtained from household surveys and previous studies regarding the distribution and quality of public spaces.	Green coverage in parks was associated with being active in public spaces for the women in this study. Participants had lower mental health scores when there was more green space in the park.
<b>Boone-Heinonen, Casanova, Richardson, Gordon-Larsen (2010); USA</b>	To estimate different behaviour-specific effects that occur in outdoor spaces and the level of PA (moderate to vigorous) in different outdoor settings.	10,773 adolescents; 5,382 girls; Age 11–21; 48.2% 11–15; 34.2% 16–17; 17.7% 18–21	Quantitative. Cross-sectional data from Wave I of The National Longitudinal Study of Adolescent Health were used.	Females living closer to a major park were associated with higher moderate to vigorous physical activity levels. Larger areas of green space were related to high levels of leisure and exercise in girls. Green spaces provide higher benefits for girls who were previously less

				active. Girls connected being in outdoor spaces to social support and feeling safer. Green spaces provide girls with the space to perform PA and act as a safe place to feel supported.
<b>Carver, Timperio, Hesketh, Crawford (2012); Australia</b>	To examine the association between perceived risk and parental constraint behaviours.	270 adolescents; 57% girls; Age 15–17	Quantitative, Cross-sectional design. Data was obtained from the Children Living in Active Neighborhoods Study and a questionnaire.	Perceived risk was a significant mediator of associations between perceived road safety and avoidance behaviour. On average girls had more parental restrictions.
<b>Chaparro, Bilfield, Theall (2019); USA</b>	To investigate if exposure to neighbourhood crime was associated with PA and overweight/obesity adolescents.	15,261 adolescents; 50.5% girls; Age 12–20	Quantitative. Data consisted of Georeferenced data from the National Health, the Nutrition Examination Survey, and the Federal Bureau of Investigation.	Adolescent girls who are exposed to high levels of crime within their neighbourhood are less likely to engage in PA and have a higher rate of being overweight/obese.
<b>Chillón, Martínez-Gómez, Ortega, Pérez-López, Díaz, Veses, Veiga, Marcos, Delgado-Fernández (2013); Spain</b>	To examine the trend of active commuting to school in Spanish adolescents over a 6-year period (2001–2002 to 2006–2007).	Study 1: 415 adolescents, 198 girls; Age 13–17 Study 2: 891 adolescents, 448 girls; Age 13–17	Quantitative. Questionnaires and data were obtained from two previous studies.	Active commuting in girls decreased significantly from 2001/2002 to 2006/2007. Belonging to a large family was related to higher active commuting in girls. The percentage of active girls decreased, but their journey duration increased.

<b>Chillón, Ortega, Ruiz, Veidebaum, Oja, Mäestu, Sjöström (2010); Europe</b>	To examine the mode of commuting to school and its association with PA and cardiorespiratory fitness.	2,271 participants; 1,218 girls; Ages 9–10 & 15–16	Quantitative. A questionnaire, accelerometry, and cycle ergometer test were used to collect data on participants.	Activity commuting to schools results in higher levels of PA and better cardiorespiratory fitness.
<b>Cobar, Borromeo, Agcaoili, Rodil (2017); Philippines</b>	To examine how birdwatching as a form of PA can immediately affect high school seniors' mood states and determine if gender affects these mood state differences.	30 students; 16 girls Age 16–17	Quantitative, Cross-sectional design. Abbreviated Profile of Mood States questionnaire was used to obtain data.	Walking and watching birds while walking can help decrease negative moods for girls. When picking between activities, it depended on which mood disturbances each girl was looking to decrease.
<b>Cohen, Han, Evenson, Nagel, McKenzie, Marsh, Williamson, Harnik (2017); USA</b>	To compare parks with walking loops to parks without walking loops. To determine if walking loops increase park users' PA levels in urban neighbourhood parks.	Boys and girls; Age 0–19 N=NA	Quantitative. Data from the National Study of Neighborhood Parks, The System of Observing Play and the Recreation in Communities (SOPARC) was used to document facilities and park users by age group, sex and PA levels.	Parks with walking loops had more female visitors than parks without them. Access to walking loops supports more moderate to vigorous PA in both boys and girls.
<b>de Paula da Silva, de Camargo, da Silva, Silva, Hino, Reis (2019); Brazil</b>	To describe the places, types, weekly frequency, duration, and volume of physical activities performed by Curitiba, Brazil adolescents.	495 adolescents; 251 girls; Age 12–17 130 girls; Age 16–17	Quantitative. Household surveys from a cross-sectional study conducted in 2013–2014 and a PA questionnaire were utilized to collect data.	Girls participate in fewer sports and more activities like walking and biking while outdoors. Girls prefer to visit parks where they can perform a wide variety of activities.
<b>Dias, Gaya, Brand,</b>	To determine whether	1,130 adolescents; 596	Quantitative.	There is a positive



<b>Pizarro, Fochesatto, Mendes, Mota, Maia Santos, Gaya (2019); Brazil</b>	adolescents' perception of road safety impacts the association between the distance from home to the nearest park and the use of the parks for PA.	girls; Age 14–20	The neighbourhood environment walkability scale, demographic questionnaire, and geographic information system were used to determine the distance from home to the nearest park.	relationship between road safety perception and PA. Understanding the characteristics of the places that may facilitate PA among girls should be a priority for health promotion.
<b>Ding, Bracy, Sallis, Saelens, Norman, Harris, Durant, Rosenberg, Kerr (2012); USA</b>	To assess the reliability of the new Fears of Stranger Danger scale and determine the associations of Fears of Stranger Danger with PA.	Parent-adolescent pairs=5,171; Adolescents age 12–18; 51% girls	Quantitative, Cross-sectional design. The neighbourhood environment walkability scale and the self-reported survey of stranger danger were used to collect data.	Outdoor PA within a neighbourhood is significantly affected by fear of stranger danger. Due to high levels of Stranger Danger in girls, they have lower levels of PA, especially in high crime areas.
<b>Dunton, Berrigan, Ballard-Barbash, Perna, Graubard, Atienza (2010); USA</b>	To describe demographic and temporal patterns in the social and physical contexts of PA among adolescents.	3,051 Participants; 1,497 girls; Age 15–18	Quantitative. Data came from the Nationally Representative American Time Use Survey (2003–2006) and telephone interviews from the Current Population Survey.	Girls participate in less PA outside due to perceived risk and fear due to several factors such as parental safety concerns.
<b>Floyd, Bocarro, Smith, Baran, Moore, Cosco, Edwards, Suau, Fang (2011); USA</b>	To examine the connection between parks and neighbourhood environments on children's and adolescents' PA.	2,712 children; 1180 girls; Age 0–18	Quantitative, Cross-sectional design. Data came from SOPARC of 20 randomly selected neighbourhood parks.	Girls enjoy playing on playgrounds more than on the courts or opened spaces. Overall, girls have low levels of PA in natural environments.

<b>Humbert, Chad, Bruner, Spink, Muhajarine, Anderson, Girolami, Odnokon, Gryba (2008); Canada</b>	To examine the intrapersonal, social, and environmental factors influencing youth PA.	160 youth; 80 girls; Age 12–18	Qualitative with an ecological framework. Semi-structured group interviews.	Girls identified that to perform PA outdoors, the environment needs to feel safe, and they need to be with friends. Being able to access facilities in their neighbourhood was important
<b>Hunter, Leatherdale, Storey, Carson (2016); Canada</b>	To examine how changes to school-based policies around PA, recreational programming and public health resources affect adolescents' level of PA.	18,777 participants; 53.6% girls; Grades 9–12; Age 14–18	Quantitative, Longitudinal Quasi-experimental. Data came from the COMPASS study, a self-reported questionnaire on PA, and the COMPASS School Environment Application to evaluate PA facilities.	To increase adolescents PA, schools need to increase access to multiple opportunities and facilities within the schoolyard. Schools that had their gym opened at lunch, had a bike rack, organized monthly hikes, had an outdoor basketball court, a weightlifting club, a walking club, or enabled access to the sports field at lunch had the highest levels of PA among girls.
<b>Janha, Hardy-Johnson, Kehoe, Mendy, Camara, Jarjou, Ward, Moore, Fall, Barker, Weller (2020); Africa</b>	To understand the perspectives of adolescents and caregivers on adolescent diet and PA in Gambia.	80 adolescents; Age 10–19, divided into 10–12 years and 15–17 years; 19 girls age 10–12; 18 girls age 15–17	Qualitative. Contextual data was used from cross-sectional surveys that focused on adolescents' height, weight and BMI; Data was also obtained from the Demographic Surveillance	For young girls, PA was done in groups and consisted of dance, playing outdoors at school, riding a bike or walking. Availability of outside space was seen as an opportunity for PA to all

			Study Database and Semi-structured focus groups interviews.	participants.
<b>Kaczynski, Wilhelm Stanis, Hastmann, Besenyi (2011); USA</b>	To examine the association between park users, demographic characteristics, and PA levels.	8,612 individuals; 50.1% girls; 5.7% teens Ages were grouped as child 1–12 years, teen 13–20 years, adult 21–59 years, or senior 60+ years	Quantitative. SOPARC was used to observe four parks, and demographics were taken of all park users.	This research speaks to the importance of identifying features that are important for females' PA in parks.
<b>Kudlacek, Fromel, Groffik (2020); Central Europe</b>	To examine the difference in weekly PA among adolescents according to their level of preference for fitness PA.	9,513 participants; 5,535 girls; Age 15–18	Quantitative. IPAQ-Long Form was used to self-reported PA and Pedometers to report PA.	Girls preferred dance, outdoor PA, running aerobics and water-based activities. For girls, an increasing trend was observed in the preference for fitness PA.
<b>Martínez-Gómez, Ruiz, Gómez-Martínez, Chillón, Rey-López, Díaz, Castillo, Veiga, Marcos, AVENA Study Group (2011); Spain</b>	To explore the connection between active commuting to school and cognitive performance in adolescents.	1,700 adolescents; 892 girls; Age 13–18.5	Quantitative, Cross-sectional design. Self-reported data on extracurricular PA and patterns of commuting to school and the Standardized Reading Ability Test of Educational was used to obtain data.	Actively commuting to school was found to be positively associated with cognitive performance in adolescent girls. Girls who actively commuted to school for longer than 15 minutes had higher scores in numeric ability, verbal ability, reasoning ability, and overall cognitive performance than the group of girls whose active transport was 15 minutes

<p><b>Mitra, Moore, Gillespie, Faulkner, Vanderloo, Chulak-Bozzer, Rhodes, Brussoni, Tremblay (2020); Canada</b></p>	<p>To examine if COVID-19 created distinct patterns of increased or decreased PA among children and adolescents. To determine how these changes are related to children and adolescents' built environment.</p>	<p>1,456 adolescents; 47% girls; Age 12–17</p>	<p>Quantitative. ParticipACTION survey and a survey to collect self-reported data were used to obtain data.</p>	<p>or shorter. Children and youths' mobility has been affected due to the closure of schools, playgrounds and recreational facilities. More youth than children experienced decreased PA-related movements during the pandemic, including walking/biking, outdoor or indoor physical exercise and outdoor play. In contrast, some children and youth have become more active through walking/biking, playing more, and increased outdoor PA.</p>
<p><b>Nelson, Foley, O'Gorman, Moyna, Woods (2008); Ireland</b></p>	<p>To determine if the distance to activities was a barrier to commuting among adolescents. To identify if there is a predestined distance which adolescents choose not to walk or cycle.</p>	<p>4,013 adolescents; 48.1% girls; Age 15–17</p>	<p>Quantitative, Cross-sectional design. Data was used from part of the PA Research in Teenagers study, self-reported questionnaires, and anthropometric measures.</p>	<p>Girls travel further by bicycle than walking. Girls who perform active transport and live further away prefer to bike. Overall, for girls walking is the main form of active transport.</p>
<p><b>Oliveira, Lopes, Abreu, Moreira, Silva, Agostinis-Sobrinho, Oliveira-Santos,</b></p>	<p>To examine if physical fitness and body composition are associated with</p>	<p>583 adolescents; 299 girls; Age 12–18</p>	<p>Quantitative. Data were obtained from the ALPHA (Assessing the Levels of Physical Activity</p>	<p>Girls had significantly higher environmental perceptions. Higher distance to local</p>

<b>Mota, Santos (2020); Portugal</b>	environmental perceptions in adolescents.	and Fitness) health-related fitness battery, anthropometric measures, the ALPHA questionnaire and the Family Affluence Scale to assess socioeconomic status.	facilities, the presence of sidewalks, and a positive aesthetics perception were associated with a lower percentage of body fat in girls. At baseline, positive environmental perceptions are associated with better physical fitness and body composition at follow-up.
<b>Perez, Conway, Arredondo, Elder, Kerr, McKenzie, Sallis (2017); USA</b>	To identify the connection between neighbourhood environmental and psychosocial factors in adolescents, specifically in PA.	910 participants; 454 girls; Age 12–16	Quantitative, Cross-sectional design. Data from the Teen Environment and Neighborhood study consisting of self-report neighbourhood leisure-time PA and accelerometer-based non-school moderate to vigorous physical activity was used.
			Parent/guardian-perceived neighbourhood safety from crime was related to girls PA in non-neighbourhoods and non-school areas. Girls who had parents with higher perceived neighbourhood safety had higher levels of PA beyond the neighbourhood and school hours. Girls had significantly more parental rules, as parents perceive girls to be at greater risk of harm such as molestation or assault. Weighing the pros and cons of PA was found to affect recreation facility density and neighbourhood PA among girls. Girls with low decisional

				balance reported more cons than pros towards PA and had less motivation to engage in PA due to their perceived risk.
<b>Ramírez-Vélez, García-Hermoso, Agostinis-Sobrinho, Mota, Santos, Correa-Bautista, Amaya-Tambo, Villa-González (2017); Colombia</b>	To investigate the association between cycling to and from school and adolescent body composition, physical fitness, and metabolic syndrome.	2,877 participants; 54.5% girls; Age 9–17.9	Quantitative. The Health Behaviour in School-Aged Children questionnaire and different measurements from physical fitness testing such as anthropometric, musculoskeletal, motor, and cardiorespiratory data were used.	Regular cycling to school may be associated with better physical fitness and a lower incidence of metabolic syndrome than passive transport, especially in girls.
<b>Reed, Price, Grost, Mantinan (2012); USA</b>	To determine park user demographics and examine PA levels of park users.	4,359 participants; 1,951 girls; 1,116 teens; Age 13–20	Quantitative. SOPARC at parks was used to collect data.	Promoting park usage may be an effective strategy for increasing PA in communities, especially girls.
<b>Ries, Gittelsohn, Voorhees, Roche, Clifton, Astone (2008); USA</b>	To explore environmental factors influencing PA performed in recreational facilities by urban African-American adolescents.	48 participants; 24 girls; Age 14–18	Qualitative. In-depth interviews and direct observations of recreational facilities were used to obtain data.	Neighbourhood parks were found to be designed for young children and do not have facilities that attract adolescents. Adolescents had a greater presence at parks that offer more athletic facilities such as basketball courts, tennis courts, swimming pools, open fields, and tracks. Young women described neighbourhood sports

<p><b>Rišová, Sládeková Madajová (2020); Slovak Republic</b></p>	<p>To determine the relationship between perceived safety and walkability. To examine adolescents' level of fear in different locations.</p>	<p>303 adolescents; 55.45% girls; Age 13–16</p>	<p>Quantitative. Self-reported walkability perception and safety perception and a mapping exercise were used to collect data.</p>	<p>facilities as male dominant. Safety concerns largely determine the use of the facilities for adolescent girls. It is important to look at additional characteristics that facilities need to consider to promote PA in environmental settings. Parks with flowers and trees attracted young women. Young women were more attracted to parks with security, places where they could hang out with friends, and parks with flowers and trees. Girls feel unsafe in public spaces both at night and during the day. Girls most commonly reported feeling threatened when they were near abandoned places, areas with a lack of people, and unfamiliar areas. Girls wrote more responses about their feelings and emotions instead of specific threats. It is important to</p>
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				limit/eliminate threats reported by the girls, as girls report feeling more fearful than boys. Girls' level of fear significantly affects where they walk and when they walk, leading to a reduced amount of PA in the form of walking.
<b>Roman, Stodolska, Yahner, Shinew (2013); USA</b>	To determine if fear, victimization, and perceived rudeness are related to outdoor PA among Latino youth.	390 youth; 206 girls; Grades 6–12 Age 13–18	Quantitative. Data came from school-based surveys and the Multicultural Scale for Adolescents to assess assimilation.	Adolescent girls who expressed greater fear of crime also reported engaging in significantly less PA and outdoor recreation. Girls are more attuned to the aesthetics of their environment. Increased assimilation into US culture corresponded to a reduction in youth's outdoor recreation.
<b>Rothe, Holt, Kuhn, McAteer, Askari, O'Meara, Sharif, Dexter (2010); USA</b>	To determine how Somali families' beliefs, barriers, and cultural issues impact youth's ability to be active outdoors in winter.	61 participants; 40 women; 11 teenage girls; Age 13–19	Qualitative. Data was obtained through focus groups.	Lack of transportation was cited as a barrier to outdoor activity. Outdoor clothing can be expensive, and some families found the cost to prohibit PA. Girls followed particular behavioural norms that excluded them from



				<p>outdoor activity, such as wearing a skirt and hijab. The Somali community voiced a concern that girls should not interact with boys over a certain age, limiting their PA. This decrease in winter outdoor activity was related to social norms and intention to participate in outdoor PA. Understanding barriers to outdoor PA among Somali children is the first step to developing programs that may support increased outdoor activity.</p>
<p><b>Sarmiento, Rios, Paez, Quijano, Fermino (2017); Colombia</b></p>	<p>To examine the PA levels, amount used, and characteristics of public parks with and without Recreovía.</p>	<p>4,925 individuals; All ages; Ages were grouped as child 1–12 years, teen 13–20 years, adult 21–59 years, or senior 60+ years</p>	<p>Quantitative. The PA Resource Assessment described the type, features, amenities, and quality of PA resources in each park; The SOPARC of parks and the demographics of park users were also collected.</p>	<p>The percentage of women was higher in parks with Recreovía, compared to parks without Recreovía. The Recreovía is a promising strategy to promote park use and PA, especially among women who are less likely to meet PA recommendations during their leisure time.</p>
<p><b>Schultz, Wilhelm Stanis, Sayers, Thombs, Thomas (2017); USA</b></p>	<p>To evaluate the impact of street crossing modifications on park use and park-based PA</p>	<p>3 years respectfully N=2,080, N=2,275, N=2,276 All ages;</p>	<p>Quantitative. SOPARC was used to collect data before the crosswalk installation and after the</p>	<p>Women reported safe access to be a concern or barrier to performing PA. Women showed a</p>

	in a low-income and African American community.	Ages were grouped as child 1–12 years, teen 13–20 years, adult 21–59 years, or senior 60+ years	installation.	significant increase in park use with the crosswalk installation. Environmental impacts on PA engagement in parks were only found for specific demographic groups. Gender was found to have the most impact on variables.
<b>Shan (2014); China</b>	To identify the motives for visiting urban green spaces. To determine if different social groups in Guangzhou, China have different motives.	595 visitors; 263 girls; 176 aged 15–24	Mixed methods. Stratified random sampling based on the 2000 Guangzhou census data and questionnaires were used to obtain data for the study.	Nature and exercise were a motive for visiting urban green spaces. The most frequently selected motive was to enjoy the fresh air and beautiful scenery and connect to nature.
<b>Spencer, Numer, Rehman, Kirk (2021); Canada</b>	To explore the relationship between gender, PA, and nutrition in adolescent girls and young women.	Seven girls; Age 13–26	Qualitative, Feminist post-structural approach. Photovoice and group discussions were used to obtain data.	Connections between nature, PA, and confidence allowed girls to find emotional safety. Girls were able to negotiate complex gender stereotypes, conflicts, and contradictions and engage in healthy behaviours. Being outside in nature provides an important context for girls and young women to engage in the complex navigation of competing discourses

<b>Tannehill, MacPhail, Walsh, Woods (2015); Ireland</b>	To identify youth experiences and how they might increase or decrease levels of PA.	124 participants; Age 12–18 N girls NA	Mixed methods. Data were collected through self-reported questionnaires and focus groups.	surrounding health. Girls linked PA to socializing with friends through activities such as walking and talking, walking the dog, and walking to each other’s houses. Adolescents have a positive attitude toward PA, which does not diminish as they age despite activity levels decreasing.
<b>Thomas (2015); Denmark</b>	To examine how different green and blue spaces improve women's health and well-being. To identify how these areas can restore mental health.	25 interviews; 4 focus groups; Women age 18–60	Qualitative. 25 semi-structured interviews.	Therapeutic landscapes, such as open green spaces, demonstrate how perceptions of space can impact women's health and well-being. Being in natural spaces played a crucial role in stress and anxiety reduction. All women reported being in natural settings to provide them with different physical or mental benefits and play a key role in stress and anxiety reduction. Cycling helped women incorporate natural environments into their daily routines.

<p><b>Van Hecke, Verhoeven, Clarys, Van Dyck, Van de Weghe, Baert, Deforche, Van Cauwenberg (2018); Belgium</b></p>	<p>To determine the prevalence, frequency and context of open public spaces. To examine the individual, social, and physical factors of open public places on adolescents.</p>	<p>173 adolescents; 54.4% girls; Age 12–16</p>	<p>Mixed Methods. An ActiGraph GTX-3 device was used to measure PA levels, a GPS device to track locations, a questionnaire was used to collect demographics, and individual interviews were used to collect spoken word data.</p>	<p>Public open spaces may be effective areas to promote PA among groups at risk for physical inactivity. In order to encourage PA among girls and older adolescents in public open spaces, urban planners should consider adding attractive features.</p>
<p><b>Ward, McGee, Freeman, Gendall, Cameron (2018); New Zealand</b></p>	<p>To determine transport behaviours and activities of teenagers and the implications of these for public health and policy.</p>	<p>775 participants; 395 girls; Age 16–19</p>	<p>Quantitative. Online surveys were used to collect data.</p>	<p>For girls, unactive transportation was the top reported response. School uniforms were reported as a barrier to active transportation.</p>
<p><b>Wilhelm Stanis, Oftedal, Schneider (2014); USA</b></p>	<p>To examine youth PA and weight status in connection to the availability of outdoor recreation resources.</p>	<p>130,908 students; Grade 9 &amp; 12 students Age 14–18</p>	<p>Quantitative. Data were obtained from the 2010 Minnesota Student Survey, where students self-reported their PA levels and BMI.</p>	<p>When it comes to outdoor PA, parks should not be the only places considered as various recreational land, and trail types may be associated with increased PA.</p>

## Appendix B

### Search Strategy From APA PsycInfo Database

#	Query	Limiters/Expanders	Last Run Via	Results
S10	S7 AND S8 AND S9	Limiters - Published Date: 20211201-20220631 Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	17
S9	S1 OR S4	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	163,059
S8	S2 OR S5	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	122,624
S7	S3 OR S6	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	404,518
S6	DE "Baseball" OR DE "Soccer" OR DE "Wilderness Experience" OR DE "Summer Camps (Recreation)" OR DE "Childrens Recreational Games" OR DE "Recreation"	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	10,826
S5	DE "Physical Activity" OR DE "Physical Fitness" OR DE "Exercise" OR DE "Aerobic Exercise"	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	48,076
S4	DE "Human Females" OR DE "Early Adolescence" OR DE "Emerging Adulthood" OR DE "Adolescent Attitudes" OR DE "Sex Role Attitudes"	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	124,718
S3	outdoor* or outside or natur* or (green N2 spac*)	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	Display
S2	( physical* N2 (activ* or fit*) ) OR exercis*	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	Display
S1	(adolescen* or teen* or youth* or young*) N3 (women or woman or girl* or female*)	Expanders - Apply related words; Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	Display