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THE RELATIONSHIP BETWEEN URBAN GREEN SPACE PERCEPTION AND USE WITHIN THE ADOLESCENT POPULATION: A FOCUSED ETHNOGRAPHY

Rachel Lyons
Duquesne University

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By

Rachel Lyons

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Alison M. Colbert, Ph.D., PHCNS-BC, FAAN Associate Professor of Nursing (Committee Chair)	Karen Jakub, Ph.D., RN Associate Professor of Nursing (Committee Member)
Matthew M. Browning, Ph.D. Associate Professor Clemson University (Committee Member)	
Mary Ellen Glasgow, Ph.D., RN, ANEF, FAAN Dean, School of Nursing, Professor of Nursing programs	Rick Zoucha, Ph.D., PMH, CNS-BC, CTN-A, FAAN Chair, Department Name Professor/Chair of Nursing PhD

ABSTRACT

THE RELATIONSHIP BETWEEN URBAN GREEN SPACE PERCEPTION AND USE WITHIN THE ADOLESCENT POPULATION: A FOCUSED ETHNOGRAPHY

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Dissertation supervised by Dr. Alison Colbert

Introduction: Greenspace is beneficial for improving adolescent mental health, yet we still do not understand the connection between the built environment and subjective mental wellbeing. We also lack understanding of how this population uses greenspace and how they feel when in it. Purpose: The purpose of this qualitative study was threefold: to understand why adolescents use greenspace, to identify how they use greenspace, and to explore how they feel when they are in greenspace. Methods: participated in a focused ethnography that utilized auto photography for photo elicitation. Braun and Clark's (2006), six phases of thematic analysis were used to guide data collection and analysis. Results: Eleven adolescents between ages 12 and 18 who resided in and around Newark, NJ, were recruited. Three themes were identified from the data: 1) A tranquil space in an unsafe place; 2) Park means family connection with burgeoning independence; and 3) My park: Sense of ownership and responsibility. Conclusions: This study

deepens the understanding between subjective mental wellbeing and urban greenspace exposure. The accepted responsibility that adolescents voiced toward maintaining “my park” strengthens community cohesion, detailing the importance of youth input during urban planning. Clinical Relevance: Implications from this study suggest that environmental interventions may help ameliorate an ongoing mental health care crisis. Healthcare providers should consider the built environment as another approach to promoting mental health.

Keywords: urban greenspace, parks, adolescent, emotional regulation, mental health

DEDICATION

I would like to dedicate this work to my husband, Patrick. Your love, patience, support, and advice throughout this journey made this possible. I am truly thankful for all that you have done and continue to do.

To my mother, for your unwavering love and support throughout everything.

To my family and friends who have supported me throughout this process.

In memory of my father, you inspired me to always be inquisitive. You will always be someone I look up to and I am forever grateful for all that you taught me.

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INTEGRATIVE REVIEW OF THE LITERATURE

Manuscript #1

Integrative Review of the Literature

Lyons, R., Colbert, A., Browning, M., & Jakub, K. (2021). Urban greenspace use among adolescents and young adults: An integrative review. Public Health Nursing, 39(3), 700–718. https://doi.org/10.1111/phn.13010.

Abstract

The purpose of this integrative review was to explore how adolescents and young adults used the social determinant of the built environment, specifically greenspace, as a potential point of intervention to address overall wellbeing, specifically mental health symptoms. The approach used strategies described by Whittemore and Knafl (2005). Peer-reviewed, published research articles in English were identified using electronic databases CINAHL, PubMed, and EMBASE. Seventeen research reports using qualitative or quantitative methods with adolescents and young adults. Each article was evaluated for quality using a critical appraisal tool by Hawker et al., 2002. Data were analyzed and then synthesized using the Matrix Method. The review elicited three themes related to the purpose and aims: elements of greenspace, activity variation, and amenities. All themes shared a common element of quality, which influenced the perception of safety and greenspace use. The science of urban greenspace and adolescent-young adult wellbeing is still relatively new. Public health nurses can incorporate social determinants of health, such as the built environment in research, to understand how greenspace is to be used as an alternative health strategy to possibly reduce mental health symptoms and improve wellbeing.
Key words: Built environment, Greenspace, Adolescent, Young Adult, Wellbeing

Urban Greenspace Use Among Adolescents and Young Adults: An Integrative Review

According to the World Health Organization (2018), a fundamental component of overall wellbeing is mental health, whereby individuals can realize and maximize their own potential. To date, one in seven adolescents in the U.S. has been diagnosed with a mental health disorder, leading to adverse health consequences later in life, and roughly only 50% of those 7,000,000 adolescents diagnosed have sought treatment (Radez et al., 2021; Whitney & Peterson, 2019). As adults, mental health disorders developed during adolescence can lead to long-term, comorbid conditions, greater resource utilization, and health costs (Sporinova et al., 2019; Whitney & Peterson, 2019). Additionally, individuals with mental health disorders are at risk for developing chronic diseases such as heart disease, cancer, diabetes, and chronic obstructive pulmonary diseases (Daré et al., 2019), therefore prevention and early intervention in mental health are important. Evidence-based treatments for mental health disorders exist in adolescence but are underutilized due to many barriers, such as perceived stigma, lack of knowledge and resources (Radez et al., 2021). Alternative strategies are needed, and researchers must look to the social determinants of health (SDOH) as potential intervention points to address mental health distress and psychological wellbeing on a larger scale.

Many youth reside in neighborhoods reconfigured by the built environment, otherwise known as the structures that provide people with living, working, and recreational spaces (United States Environmental Protection Agency, 2020; Vanaken & Danckaerts, 2018). The neighborhood and built environment are critical SDOH (Jennings & Bamkole, 2019) and are becoming increasingly accepted as an intervention aimed at improving wellbeing by reducing mental health symptoms (Alegría et al., 2018; Compton, & Shim, 2015; Dunne, et al., 2017). Greenspace is part of that built environment and is loosely defined as parks, open grass-covered

areas, tree canopy, and or vegetation (Taylor et al., 2019), and it has benefits to physical, mental, and social wellbeing (Dawson et al., 2019; Foster et al., 2017; Kondo et al., 2018; Yang et al., 2021).

Studies that include greenspace report correlations between exposure to greenspace with reduced violence, mental fatigue, and stress (Engemann et al., 2019; McCormick, 2017; Vanaken & Danckaerts, 2018). Others depict greater social cohesion within the community (Jennings & Bamkole, 2019; Lin et al., 2017; Wickes et al., 2019), but how adolescents and young adults actually use the important SDOH of green space is poorly understood. In the formative growth and development stages of adolescence and young adulthood, it is vital to explore how this population uses the built environment, which is a key component to implementing the use of green space as a feasible intervention.

Purpose

Given what is known about the potential benefits of greenspace "exposure," measured by self-report or remote sensing devices, such as Landsat TM remote sensing imagery, the purpose of this review was to explore how adolescents and young adults use their built environment of greenspace. The findings provide recommendations on implications for practice and future research.

Methods

Literature Search

Whittemore and Knafl's (2005) process guided this integrative review. The steps are (a) problem identification, (b) systematic literature search, (c) data evaluation (d) data analysis, and (e) presentation of results. This method provides a comprehensive understanding of the complex concepts that surround greenspace use. Additionally, this approach allows for the simultaneous

inclusion of experimental and non-experimental research to understand the current state of knowledge, including defining concepts and theories and analyzing methodological issues related to greenspace research.

Search Strategy

To explore the relationship of greenspace, use in the adolescent/ young adult population, published research articles were identified using three electronic databases (CINAHL, PubMed, and EMBASE) with an experienced health sciences librarian's assistance. Search terms included greenspace, adolescents and young adult. Keywords related to greenspace included ((“city forest*” OR “city green area*” OR “city green space*” OR “city greenspace*” OR “city park*” OR “green area*” OR “green infrastructure*” OR “green space*” OR “greenness” OR “greenway*” OR “greenspace*” OR “neighborhood park*” OR “neighbourhood park*” OR “public open space*” OR “urban forest*” OR “urban green area*” OR “urban green space*” OR “urban greenspace*” OR “urban nature” OR “urban park*”) OR (M.H. “Urban Areas” AND MH “Natural Environment”)). Keywords related to the population identified included (adolescen* or M.H. “Adolescence” OR 'young adult*” OR MH “Young Adult”)). Additional publications were identified through ancestry-search methods used during the review of previously identified articles.

Inclusion/Exclusion Criteria

During the literature search phase, articles meeting inclusion criteria were retrieved for full-text review. Criteria for inclusion were: (a) research purposed to identify greenspace use within adolescent (>10 years old), or young adult population ($\leq$25 years old), (b) included quantitative, qualitative, or mixed methods designs, (c) studied any area of geography including outside of the United States, (d) written in the English language, and (e) all years. The age range

of >10 years and <25 years is consistent with the World Health Organization's (2014) definition of adolescence or young adult populations. The cutoff date was February 1, 2021. Articles were excluded if they did not address greenspace utilization in some capacity. Reviews and commentaries were also excluded.

Retrieved citations (n=1344) were imported from EndNote X9 into the Covidence software program (2020) designed to manage systematic reviews. A total of 416 duplicates, defined as studies with the exact author, publication year, and title, were identified and removed, which left 928 articles to be screened. Titles and abstracts were reviewed for inclusion/exclusion criteria, and 86 articles were identified for full-text and ancestry review. Of those, 17 articles met the inclusion criteria for this integrative review (Figure 1).

Data Evaluation

The final 17 articles identified were evaluated for quality using a critical appraisal tool (Hawker et al., 2002). Data relevant for this review included the aim and purpose related to greenspace use, the sample, intervention, and methods of data collection and analysis (Garrard, 2017). Using a process adapted from another study that used the appraisal tool (Lorenc et al., 2014), the studies were graded with a numerical score from 1 (very poor) to 4 (good) (Table 1).

Data Analysis

The process of data reduction included extracting and coding data from primary sources to simplify, abstract, focus, and organize the data into a manageable framework to display and compare conclusions. Table 2 describes the key elements of the studies in detail.

Thematic analysis was used for synthesizing findings across the included studies, using the six phases outlined by (Braun & Clarke, 2006). NVIVO 12 (QSR International) was used to organize and support thematic data analysis and the construction of themes. First, the researcher

became immersed in the data, reading and re-reading each article and maintaining notes for initial coding. Next, codes relevant to the research question were sorted into potential themes and subthemes using a thematic map, as suggested by Braun and Clarke (2006). Last, a thematic map was created to visualize the links and relationships between themes and subthemes (Figure 2).

Results

Description of Sample Studies

The final sample yielded a total of 17 articles and included quantitative (n =12), qualitative (n =3), and mixed methods research reports (n =2). Most quantitative studies (n=10) used survey methods. One study used a natural experiment to measure participants' activity levels before and after an urban renewal that created greenspaces (Andersen et al., 2017). Study populations represented adolescent or young adult participants' perspectives, primarily through self-report or interviews. Many qualitative studies contained focus groups of adolescents (Brockman et al., 2011; Gallerani et al., 2017), and one study interviewed participants while walking in urban greenspace (Van Hecke et al., 2016).

Articles were published in a broad range of disciplinary journals, primarily within public health, urban planning, and exercise physiology fields. None of the articles were published in nursing journals or were identified as having been written by authors who reported practicing nursing. Studies assessed preferences of greenspace using photos, questionnaires, or global positioning system (GPS) devices that tracked participant's locations. Most of the studies were conducted in urban areas outside of the U.S. (n=12) and represented six countries: Australia, Iran, Belgium, Denmark, the United Kingdom. The selected articles identified participant's gender and education; however, none reported participant's ethnicity or family's socioeconomic status. If greenspace was quantified (n=7), mapping software and graphical indicators such as

geographical information systems (GIS) and normalized difference vegetation index (NDVI) were applied.

Studies primarily explored the relationship between recreational amenities that can exist in some greenspaces, like parks (e.g., basketball courts), and physical activity levels (n=9). Physical activity was what many authors deemed as greenspace "use" and was tracked with GPS devices (n=5) or interviewing participants (n=5). In some studies, the terms "use" and "activity" were interchangeable. For instance, Oreskovic et al. (2015) stated that their study's main focus was adolescent's use of the built environment. They reported that overall activity, measured as time spent in specific geographic locations, was greatest in outdoor settings such as playgrounds and sidewalks, but the authors omitted details on actual use. Perception of greenspace and visiting greenspace were the main foci of another four articles (Barr et al., 2014; Bloesma et al., 2018; Dias et al., 2019; Gallerani et al., 2017).

Synthesis- Themes

The review identified three themes related to this review's purpose and aims. All themes shared the common thread of greenspace quality, which influenced perceptions of greenspace safety and greenspace use.

Elements of greenspace. This theme consists of greenspace quality, location, and safety. Elements included how attractive a park was and what the park had in terms of grass, fields, tree canopy, and well-lit paths. Mertens et al. (2019) found that upkeep was by far the most critical park characteristic for visitation and that, combined with outdoor equipment, determined whether an adolescent or young adult would use it. Poorly lit structures, broken glass on the ground, and overfilled trash receptacles contributed to perceptions of greenspace upkeep and safety and had a negative effect on greenspace use regardless of proximity or gender (Bloemsma et al., 2018).

Similarly, Edwards et al. (2015); Van Hecke et al.(2016) reported that respondents valued the actual greenness of greenspace, and that perceptions of greenness was a critical characteristic for its use; in other words, the greener the park, the more likely it was used.

Weather also played a role in greenspace use. Winter reduced greenspace use, but if adolescents reported that greenspace was important, they still used it in the winter season. The rain kept most participants from using greenspace regardless of the season (Brockman et al., 2011; Oreskovic et al., 2015).

Activity variation

This theme refers to the type of activity in greenspace and who was likely to participate in that activity. The majority of greenspace use was for physical activity in structured and unstructured forms (Edwards et al., 2015; Holt et al., 2019; Klinker et al., 2014). Moderate to vigorous activity in greenspaces, measured by accelerometers or self-report, was greater in boys than girls (Mertens et al., 2019; Moore et al., 2014; Van Hecke et al., 2018). Although the type of activity did not necessarily differ for girls, if the proximity of greenspace concerning their place of residence was more than walking distance, they were less likely to use greenspace (Barr-Anderson et al., 2014; Boone-Heinonen et al., 2010).

Greenspaces were also used for relaxation and leisure, such as walking a dog or having a picnic. Engaging in these types of activities was commonly sought out by young adults (Mertens et al., 2019). However, some adolescents reported using greenspace for rest and quietness as well (Van Hecke et al., 2016). Loud music, lack of greenness, and unkempt areas were deterrents for these types of activities (Edwards et al., 2015; Gallerani et al., 2017).

Adolescents were particularly likely to use greenspace to “hang out” and socialize. Time spent using greenspaces for recreational activities such as walking or being with peers was

associated with a higher likelihood of having three or more close friends. The duration of time spent in greenspace with friends was greater for boys than it was for girls, and choosing a specific greenspace to use was determined by which friends were using it (Van Hecke et al., 2016).

Amenities

This theme encompasses the provision and quality of equipment in greenspaces. Utilities such as water fountains, toilets, bicycle racks, basketball courts, sheds, and tables encouraged adolescents to visit greenspace and influenced activities' type and duration (Bloemsma et al., 2018; Edwards et al., 2015; Mertens et al., 2019; Oreskovic et al., 2015; Van Hecke et al., 2016). Supplying these amenities extended the duration of greenspace use and encouraged other community members to use the greenspace (Edwards et al., 2015). If greenspaces were accessible and promoted quality and safety, the likelihood of using these facilities also increased (Dias et al., 2019; Gallerani et al., 2017).

Discussion

The focus of this review was to explore how adolescents and young adults use greenspace. Overall, “use” covered various things, including physical activities, socializing, and to a lesser extent, relaxation. Moderate to vigorous activity in greenspaces was higher in boys than girls, consistent with findings from other studies outside of this review (Armstrong et al., 2018; Li et al., 2016). Greenspace was used mainly for physical activity, including structured and unstructured activity and limited relaxation and meditation. These findings are consistent with other reviews across the lifespan (Evenson et al., 2016; Evenson et al., 2019) and reflect developmentally appropriate activities.

Social factors were an essential aspect of greenspace use. This can be explained by greenspace facilitating social capital, which potentially leads to improved health outcomes, senses of belonging, and place attachment (Jennings & Bamkole, 2019; Kondo et al., 2018; Vanaken & Danckaerts, 2018). Peer support and relationships during this age range are paramount to adult or parental support (Eccles, 1999). Greenspace may act as a conduit for building and strengthening peer relationships since most adolescents and young adults reported that they visited greenspace with friends/classmates more than siblings, parents, or alone (Van Hecke et al., 2018). This conduit of social capital may be a mediating link to improving adolescent mental health (Jennings & Bamkole, 2019).

Attributes of greenspaces that included quality and safety influenced use, and this finding is consistent with other studies of other age ranges (Park, 2020; Van Hecke et al., 2018). If adolescents and young adults did not perceive greenspace to be safe or felt that such spaces were lackluster in what they had to offer in terms of facilities or quality, they were not used (Dias et al., 2019; Edwards et al., 2015; Mertens et al., 2019; Van Hecke et al., 2016). These findings are consistent with other studies exploring the complexities of place-based relationships (Burrows et al., 2018; Chen et al., 2020; Hunter et al., 2019; Irvine et al., 2013). The studies identified in this review did not address the potential "dark side" of greenspace, whereby urban greenspace becomes a venue for illicit behavior and crime (Kimpton et al., 2017; Shepley et al., 2019; Taylor et al., 2019). This may account for the quality and safety concerns mentioned and should be considered in future research.

Adolescents also reported not being asked about their attitudes or recommendations regarding greenspace planning or improvements (Gallerani et al., 2017). When asked about park attractiveness or improvements, many participants stated that they had not been asked, never

noticed or had not voiced concerns about it (Gallerani et al., 2017). Input from this population is vital to understand how and why adolescents and young adults use or do not use greenspace, which would inform future urban greenspace design and planning.

Limitations

This review has several limitations. The quality, proximity, and accessibility of urban greenspace were considered for some but not all studies, which may or may not contribute to this review's findings of variation of greenspace use. For instance, accessibility for persons with a disability was omitted in all selected studies and could be a viable component to explore for future research. Cultural context was also missing from most of the studies extracted and may be an important role in the usage of green space. There may be cultural influence, on how and why green space is used, which is vital for green space planning. Moreover, greenspace was operationalized differently across sample studies, which may have different connotations when participants and researchers are reporting results, making comparisons and syntheses difficult. Much of the literature surrounding greenspace use in this population focuses on physical activity and the relationship with physiological measures, such as body mass index. It is possible that relevant studies were overlooked since physical activity was not included in the search terms. To address this, the search strategy was exhaustive and sought to include a large segment of the published literature. Additionally, one author was responsible for screening the articles and abstracts and the preliminary data reduction; however, the team verified the results and developed the themes. Lastly, our focus was on urban greenspace use so findings may not translate over to rural greenspace use (i.e., state/national forests and parks). In our defense, families have been increasingly urbanized, and greenspace tends to favor health benefits more in

more urban areas than less urban areas so the focus on urban greenspace is justified (Browning et al., 2021).

Implications for Nursing Research

While this emerging body of research is interdisciplinary, none of the authors of the included papers appeared to be nurses. Rigorous nurse-led inquiry is needed to assess measurable relationships between the themes identified, greenspace use, and adolescent mental health. From this review, safety was a concern for greenspace use, but only five studies considered its impact on use; a nursing perspective may have included this essential element, primarily since the role of public health nurses encompasses identifying emerging patterns that potentially threaten the public's health.

Public health nurses play a vital role in all adolescent and young adult health prevention levels. They are well suited to assess health issues and incorporate SDOH, such as greenspace, as interventions to promote mental wellbeing. Nursing research exploring pathways linking the built environment to improved health in vulnerable populations will support advocacy for change, health promotion, and community empowerment (Jerofke-Owen & Bull, 2018).

The relationship between greenspace use and adolescent and young adult perspectives on greenspace value is critical. This age bracket is likely to interact with greenspace much differently than a child or an older adult. Future research should include assessing adolescent perspectives on green space to explore how it is used.

Conclusion

The science of urban greenspace and adolescent-young adult wellbeing is still relatively new. Research gaps continue to exist in understanding how adolescents and young adults use greenspace. Focusing on elements of green space can significantly contribute to how and why

this population uses greenspace. If greenspace is to be used as an alternative health strategy to improve wellbeing and minimize mental health symptoms, input from this demographic is sorely needed to support greenspace as a health intervention within this population, inform public health policy and urban planning.

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Table 1

Results of the Quality Assessment

Study	Abstract /Title	Introduction /Aims	Data Collection	Sampling	Analysis	Ethics /Bias	Results	Generalizability	Implications	Total	Grade/ Comments
Andersen et al.	4	2 no research question(s)	3	3	3	3	3	2	2	25	B. Adolescents spent more time in urban renewal than before. No follow up. Lacked generalizability and research question not well stated.
Barr-Anderson et al., 2014	4	3	3	3	3	3	4	3	3	29	B. Girls were more likely to use parks, paths, private fitness facilities, and recreational centers if they perceived the physical activity opportunity to be within walking distance of their homes. Gender was girls only.
Bloemsma et al.	4	3	3	3	3	1	3	2	3	25	B. Adolescents reported visiting green space mostly for physical activities and social activities and less often for relaxation and to

											experience nature and quietness. Ethics/ Bias not addressed.
Boone-Heinonen et al.	3	2 no research question(s)	2 Survey design and sampling frame are described elsewhere	4	3	1	2	2	3	22	C. Article did not specifically have research question and format of original research was difficult to follow.
Brockman et al., 2011	3	3	4	4	4	3	4	3	3	31	A. Children were motivated to engage in active play because they perceived it to be enjoyable, to prevent boredom, to have physical and mental health benefits and to provide freedom from adult control, rules and structure. Perspectives for this age group.
Dadvand et al.	4	4	4	4	4	4	4	3	4	35	A. Longer time spent in green spaces, was associated with enhanced self-satisfaction and improved social contacts in a population-based sample of Iranian

											adolescents. Not generalizable.
Demant Klinker et al.	4	4	4	4	3	4	4	3	3	33	A. Study was able to capture usage (leisure and subdomain urban green space) during weekend and weekdays and separated by gender and month, however how participants used is unclear.
Dias et al.	4	4	4	4	4	4	4	3	4	37	A. Road safety was variable on green space use. The shorter the distance to park, and safer roads, the more used
Edwards et al.	4	4	4	4	4	3	3	3	4	34	A. Park use was associated with presence of amenities for structured and not structured activity.
Gallerani et al.	4	4	4	4	4	2	4	3	4	33	A. Perceptions of challenges and benefits of youth engagement. Research project aimed at increasing youth advocacy

											through participatory action.
Holt et al.	4	4	4	3	3	3	3	3	3	30	A. students who frequently engage with green spaces in active ways report higher quality of life, better overall mood, and lower perceived stress.
Klinker et al.	4	4	3	3	3	2	4	3	3	29	B. Boys spent a large proportion of time accumulating MVPA in UGS. MVPA was focus, not use.
Mertens et al.	3	4	3	3	4	2	4	3	3	29	B. Online questionnaires and park picture using adobe photoshop- so lived experience hard to extract. Correlations even more so.
Moore et al.	4	4	3	3	3	3	4	3	3	30	A. hard to generalize- kids in England and UGS use was not priority
Oreskovic et al.,	4	4	3	4	4	4 assent	4	3	3	33	A. Mainly focused on identifying where P.A. takes

											place and not how
Van Hecke et al.	4	4	4	4	4	3	3	3	4	33	A. Interesting approach to walk with participants to glean experience in real time
Van Hecke et al.	4	4	4	4	3	3	4	3	3	32	A. lacking variability in the POS locations that were used it was not possible to study the associations for the different types of POS locations that were used with time, sedentary time and physical activity in POS.

Adapted from (Hawker et al., 2002; Lorenc et al., 2014)

Table 2

How is Greenspace Used by Adolescents and Young Adults?

Authors, Title, Journal	Year	Purpose	Design	Sample/ Setting	Variables	Intervention	Data Collection & Analysis	Results & Recommendations	Data Evaluation Score
Henriette Bondo Andersen et al., (2017). Increases in use and activity due to urban renewal: Effect of a natural experiment. ***American Journal of Preventive Medicine***	2017	To evaluate whether the urban renewal led to changes in time spent and physical activity in the project area among adolescents, measured by accelerometry and GPS devices.	Pre and Post Experimental Cohort Quant	Adolescents aged 11–16 years (Grades 5–8) attending four public schools in or just outside the Haraldsgade Denmark (n=354 pre and n=319 post)	Physical activity, height, weight, new urban greenspace	Four new urban greenspaces and playgrounds were created in the District and the renovation of a large public park (Fælledparken) and the establishment of a new public space (Superkilen) took place just outside the district. All renewal took place between 2010 and 2012.	A combination of accelerometer, GPS, and GIS data were used to assess changes in P.A. behavior in their temporal and spatial context. Objective PA was recorded as an activity count every 2 seconds using an ActiGraph accelerometer 7 consecutive days. Self report for health. Descriptive statistics using t test and Wilcoxon's rank-sum test.	At baseline, the adolescents generated on average 3.0 valid days of combined accelerometer and GPS data and at follow up 4.02 ($p<0.001$). Urban renewal project created a district where adolescents wanted to spend time and be physically active.	25
Barr-Anderson et al., (2014). Perception vs Reality: Is Perceived or Objective Proximity to Physical Activity Opportunities in the Environment More Associated With Recent Use	2014	To examine associations between perceived (girl-reported) and objective (Geographic Information System (GIS)-generated) measures of physical	Prospective Cohort Quant	(n=356) girls enrolled in the program and completed baseline assessment (mean age = 15.8 ± 1.17 years) 28.4% reporting they were Black or African	Perceived and objective proximity of physical activity opportunities to each girl's home, recent use of the opportuniti	Participants were high school girls enrolled in New Moves, an intervention study that included an all-girl physical education class which provided a supportive environment to promote physical	GIS software (EsRi, 2006) was used to geocode the addresses of physical activity opportunities (e.g., parks, walking/ biking paths, private fitness facilities, and recreational/com	Girls were more likely to use parks, paths, private fitness facilities, and recreational centers if they perceived the physical activity opportunity to be within walking distance of their homes	29

Among Adolescent Girls? ***Women in Sport & Physical Activity Journal***		activity opportunities near their home environments, such as parks, walking/biking trails, private fitness facilities, and recreational centers; and to compare relationships between both girls' perceived and objectively-measured neighborhood environment and the girls' reported use of these physical activity opportunities.		American, followed by 24.5% White, 23.0% Asian, 14.3% Hispanic or Latina, and 9.8% American Indian, mixed, or other	es, physical activity behavior, body mass index (BMI), school location,	activity and address weight-related issues	munity centers) in local neighborhood environments. Physical activity was assessed using the 3-Day Physical Activity recall (3DPAR) survey To assess perceived proximity of neighborhood physical activity opportunities, surveys were used		
Bloemsma et al., (2018). Greenspace visits among adolescents: Frequency and predictors in the PIAMA birth cohort study. ***Environmental Health Perspectives***	2018	To examine whether adolescents visit greenspaces and for what purposes. To identify the predictors of greenspace visits.	Cross sectional - Quant	Dutch Prevention and Incidence of Asthma and Mite Allergy (PIAMA) birth cohort (n=1911 adolescents)	Proximity to and quantity of greenspace from residence, types of greenspace activities, dog ownership and perception of greenspace importance and	None	Questionnaires. five binary outcome variables were created and answered via self report: Visiting greenspace at least once a week for a) physical activities(yes/no); b) social activities(yes/no); c) relaxation(yes/no) ; d) experiencing nature and	The perceived importance of a green environment is the only predictor that was strongly and consistently associated with all five outcomes Adolescents who reported that a green environment was (very) important to them visited greenspaces more often than adolescents for	25

					characteristics (green-not very green), education, seasons		quietness(yes/no); and e) any of the types of activity mentioned before(yes/no). All activities took place in summer. Unadjusted associations between each of the potential predictors and the five outcomes(visiting greenspace at least once a week for any type of activity, for physical activities, for social activities, for relaxation, and for experiencing nature and quietness). Multivariable log-binomial regression analyses.	whom a green environment was not important [PR (95% CI): 6.84 (5.10, 9.17) for physical activities and 4.76 (3.72, 6.09) for social activities] Boys visited greenspaces more often for physical and social activities than girls[PR (95% CI)1.12(1.01,1.24); P.R. (95%CI)1.15(1.02, 1.28), and adolescents who owned a dog were1.5–1.7 times more likely to visit greenspaces at least once a week to experience nature and quietness. Adolescents with a high level of education visited greenspaces less often for social activities[PR0.85(95%CI:0.75, 0.96)] and relaxation [PR0.84(95%CI:0.71,0.99)]than adolescents with a low to intermediate level of education	
Boone-Heinonen et al., (2010). Where can they play? Outdoor	2010	To estimate behavior-specific effects of	Cross sectional- from prospect	Adolescents (n=10,773) aged 11-21	Moderate to vigorous physical activity,	None	(1) greenspace coverage and distance to the nearest (2)	Availability of major or neighborhood parks was	22

spaces and physical activity among adolescents in U.S. urbanized areas. *Preventive Medicine*		several objectively-measured outdoor spaces on different types of moderate to vigorous physical activity (MVPA) in a large, diverse sample of U.S. adolescents.	ive cohort data Quant		greenspace coverage, distance to major or minor parks, socioeconomic status		neighborhood park and (3) major park on four self reported MVPA outcomes: (1) ≥5 MVPA bouts/week, (2) wheel-based activities, (3) active sport, and (4) exercise. Logistic regression to analyze	associated with higher participation in active sports and, in females, wheel-based activity and reporting ≥5 MVPA bouts/week [OR (95% CI): up to 1.71 (1.29. 2.27)]. Greater greenspace coverage was associated with reporting ≥5 MVPA bouts/week in males and females [OR (95% CI): up to 1.62 (1.10, 2.39) for 10.1 to 20% versus ≤10% greenspace] and exercise participation in females [OR (95% CI): up to 1.73 (1.21, 2.49)]. Provision of outdoor spaces may promote different types of physical activities, with potentially greater benefits in female adolescents	
Brockman et al., (2011). Children's active play: self-reported motivators, barriers and	2011	To establish what motivates children to engage in independent	Qualitative	Year 6 pupils 10-11 years of age (n=77)in U.K.	Active play, Social Cohesion, seasons	None	Focus groups (n=11) 1) why do children engage in active play?; 2) what factors limit children's active	Children were motivated to engage in active play because they perceived it to be enjoyable, to prevent	31

facilitators. ***BMC Public Health***		active play, whether children are happy with the license afforded by their parents, what barriers children perceive, and how, in these times of rapid social, environmental and technological change, they and their families are overcoming these barriers.					play?; 3) what factors facilitate children's active play? Each group consisted of 4-8 boys and girls	boredom, to have physical and mental health benefits and to provide freedom from adult control, rules and structure.	
Dadvand et al., (2019). Use of greenspaces, self-satisfaction and social contacts in adolescents: A population-based CASPIAN-V study. ***Environmental Research***	2019	To explore if more use of green spaces are associated with improved self-satisfaction and enhanced social interaction in adolescents.	Cross sectional - Quant	Based on a population-representative sample (n= 10,856) adolescent (10–18 years old) living in urban and rural districts across 30 provinces of Iran	Self-satisfaction, social contacts, stress, bullying and greenspace use	None	Questionnaires related to time spent in greenspaces (separately for parks, forests and private gardens), self-satisfaction, social contacts (number of friends and time spent with friends), and socio-demographic characteristics for all seasons	More time spent in greenspaces was associated with improved self-satisfaction and social contacts. Time spent in greenspaces could provide policymakers with measures to improve mental wellbeing of adolescents.	35
Demant Klinker et al., (2015). When cities move children: development of a new	2015	To first describe a novel method to assess context-specific	Natural experiment- Quant	Copenhagen Participants were children and adolescents (n=367) in grade 5–8 attending	BMI, Sub domains of leisure use, seasonal variation	Urban renewal	GPS worn for 7 consecutive days. Questionnaires that included self-report on health status, perceived	Higher proportion of girls compared to boys were in urban greenspace and engaged in passive transport	33

methodology to assess context-specific physical activity behaviour among children and adolescents using accelerometers and GPS. *Health & Place*		physical activity patterns developed and used on the WCMC study and second to investigate the method efficiency by providing descriptive results on the use of domains and subdomains, and assessing how much of the total time can be assigned to these predefined contexts using the new methodology		four public schools located in or just outside the Haraldsgade district.			neighborhood characteristics and possibilities for being physically active.	during weekends. The majority of the participants' time during weekdays was spent in the school domain(302.3min), followed by leisure(247.1min). Leisure subdomain of greenspace= 7.4 minutes. Weekends urban greenspace= 4.1 minutes	
Dias et al., (2019). Distance from home to the nearest park and the use of the parks for physical activity: the mediator role of road safety perception in adolescents. *Public Health*	2019	To examine whether adolescents' road safety perception (RSP) acts as a mediator on the association between the distance from home to the nearest park and the use of the parks for physical activity (P.A.).	Cross sectional- Quant	random sample of n= 1130 adolescents (534 male), corresponding to 47.3%, 14- 20 years old, from Porto Alegre, Brazil	Greenspace use, Road safety perception, Physical activity	None	Road safety: Neighborhood Environment Walkability Scale for Youth. Park use, socioeconomic status, age, and sex were measured using a questionnaire	Road safety perception is independently associated with less distance from home to the nearest park (P =0.04) and use of the parks for P.A. (P = 0.02). Road safety perception is a mediator and explains 16% of the association between park use and distance from home to the park	37

Edwards et al., (2015). Associations between park features and adolescent park use for physical activity. ***International Journal of Behavioral Nutrition and Physical Activity***	2015	To examine which environmental park features, and combination of features, were correlated with higher levels of park use for physical activity among adolescents	Cross sectional- Quant	Western Australian adolescents aged 11-15 (n=1304	'high' and 'low' park use for physical activity and park features	None	Survey items asked participants: 1) whether they 'used any park within the last 12 months for physical activity'; and 2) to identify the park they used most often for physical activity.	27% of participants reported using their closest park for physical activity. Park use was associated with presence of a skate park, walking paths, barbeques, picnic table, public access toilets, lighting around courts and equipment and number of trees >25.	34
Gallerani et al., (2017). "We actually care and we want to make the parks better": A qualitative study of youth experiences and perceptions after conducting park audits. ***Preventive Medicine***	2017	To explore youths' experiences and perceptions about community engagement as a result of participating in a community-based data collection project using paper and mobile technology park environmental audit tools.	Qualitative	Greenville County, SC (Ages 11–18, n= 50)		None	Focus groups: explored the youths' experiences participating in the project, changes as a result of participation, suggested uses of park audit data collected, and who should use the tools	A better understanding of the perceived challenges and benefits of youth engagement can facilitate more operative methods for public health officials and researchers to target interventions and projects aimed at increasing youth advocacy through participatory action.	33
Holt et al., (2019). Active and passive use of greenspace, health, and wellbeing	2019	to examine the type and frequency of greenspace interactions that are most	Cross sectional- Quant	n=207 University students in SE USA. The majority of students were	Greenspace use, QOL, seasonal influences	None	Survey regarding greenspace use as high versus not high active and quality of life	students who frequently engage with greenspaces in active ways report higher quality of life,	30

amongst university students. ***International Journal of Environmental Research and Public Health***		strongly associated with indicators of health and wellbeing, and investigate student characteristics associated with frequent use of greenspace.		freshmen or sophomores (74.4%), white (85.5%), and female (69.6%)				better overall mood, and lower perceived stress. Passive greenspace interactions were not strongly associated with indicators of health and wellbeing.	
Klinker et al., (2014). Using accelerometers and global positioning system devices to assess gender and age differences in children's school, transport, leisure and home based physical activity. ***International Journal of Behavioral Nutrition and Physical Activity***	2014	To identify and assess domains (leisure, school, transport, home) and subdomains (e.g., recess, playgrounds, and urban greenspace) for week day moderate to vigorous P.A. (MVPA) using objective measures and investigate gender and age differences	Cross sectional- Quant	367 Danish children and adolescents (11–16 years, 52% girls)	Exercise, gender, BMI	None	Actigraph GT3X Activity accelerometer and a QStarz BT-Q1000X GPS devices worn for five weekdays and two weekend days Self-report BMI Descriptive statistics	Children compared with adolescents accumulated more MVPA, primarily through more school MVPA ($p < 0.05$). Boys spent a large proportion of time accumulating MVPA in playgrounds, active transport, Physical Education, sports facilities, urban greenspace and school grounds. Girls spent a significant proportion of time accumulating MVPA in active transport and playgrounds. No gender or age differences were found in the home domain.	29
Mertens et al., (2019). Differences in	2019	To investigate whether there are subgroups	Cross sectional- Quant	Adolescents (12–16 years; mean	P.A. behavior, park use	None	Online questionnaires about participant	Park upkeep was the most important park characteristic	29

park characteristic preferences for visitation and physical activity among adolescents: A latent class analysis. *PLoS One*		with different preferences regarding park characteristics for park visitation and park-based P.A. among adolescents		age 13.3 ± 1.3 years). n=972 Flanders (Belgium).	characteristics (e.g., accompaniment to park, usual activities during park visitation, usual transportation to parks)		characteristics and two sets of ten randomly assigned choice tasks using manipulated photographs developed with Adobe Photoshop software. Latent class analysis	for park visitation as well as park-based P.A. among at risk subgroups (i.e., adolescents with lower overall P.A. levels, girls, older adolescents. Starting point to advise policy makers and urban planners when designing or renovating parks that investing in good upkeep and maintenance of parks, and the provision of a playground or outdoor fitness equipment might be the best strategy to increase both park visitation and park-based P.A. among at risk adolescent subgroups.	
Moore et al., (2014). The environment can explain differences in adolescents' daily physical activity levels living in a deprived urban area: cross-sectional study using accelerometry,	2014	To measure physical activity (P.A.) levels in a sample of 28 adolescents (aged 11 to 14 years) and describe the environmental context of their activity and explore where they are	Mixed Methods	Adolescent (ages 11 to 14 years) Middlesbrough England	PA, environment,	None	GPS/Accelerometer were worn x 7 days Focus groups x2	all participants were relatively inactive throughout the observed period although bouts of moderate-vigorous physical activity (MVPA) were identified in 4 contexts: school, home, street, and rural/urban greenspaces, with	30

GPS, and focus groups. *Journal of Physical Activity & Health*		most and least active over a 7-day period						MVPA levels highest in the school setting	
Oreskovic et al.,(2015). Adolescents' use of the built environment for physical activity. *BMC Public Health.*	2015	To describe the locations where adolescents engage in physical activity and compare traditional intensity-based measures with continuous activity when describing built environment use patterns among adolescents.	Quant	Adolescents aged 11–14 years (n=80) with 44% male, 40% white, 23% black, 36% Hispanic or Latino, and 49% overweight or obese.	P.A., BMI, environment, seasons	None	GPS/Accelerometer worn for 12 days: (range:3–26) days of combined data were collected per subject, with a mean of 7.8 (range:3–14) days in the first season (n = 79) in which data were collected and 8.4 (range:3–18) days in the second season (n = 45).	Compared to being at home, being at school, on the streets and sidewalks, in parks, and playgrounds were all associated with greater odds of being in moderate-to-vigorous physical activity and achieving higher overall activity levels. Playground use was associated with the highest physical activity level	33
Van Hecke et al., (2016). Social and physical environmental factors influencing adolescents' physical activity in urban public open spaces: A qualitative study using walk-along interviews. *PLoS ONE*	2016	To determine which social and physical environmental factors affect adolescents' visitation and physical activity in POS in low-income neighbourhoods.	Qualitative	Participants (n = 30, aged 12–16 years, 64%boys) were recruited in POS in low-income neighbourhoods in Brussels, Ghent and Antwerp (Belgium).		None	Participants were interviewed while walking in the POS with the interviewer.		33

Van Hecke et al., (2018). Factors related with public open space use among adolescents: a study using GPS and accelerometers. ***International Journal of Health Geographics***	2018	To describe the prevalence, frequency, and context of public open space visitation and to gain insight into the individual, social and physical environmental factors associated with public open space use	Mixed Methods	12- to 16-year-old Flemish (Belgian) adolescents. (n=173)	(age, gender, ethnicity, education, sport club membership and accompaniment) and the amount of time, sedentary time, light-, moderate- to vigorous- and vigorous-intensity physical activity at public open spaces.	None	Global positioning system devices, accelerometers, and one-on-one interviews	boys, younger adolescents, non-western-European adolescents, and lower educated adolescents were more likely to use public open spaces. Additionally, boys and younger adolescents were more likely to accumulate physical activity at public open spaces. The only social environmental variable associated with time spent at public open spaces was accompaniment by siblings: adolescents spent more time at public open spaces when accompanied by their siblings

Adapted from Health Sciences Literature Review Made Easy: The Matrix Method *by Judith Garrard*

2.0 Dissertation Proposal

The Relationship Between Urban Green Space Perception and Use Within the Adolescent Population

Specific Aims

Yearly, one in seven adolescents in the United States experience a mental health disorder (National Alliance on Mental Illness, 2020; Whitney & Peterson, 2019), costing nearly $150 billion (Konnopka & König, 2020). Of the 7.7 million youth who are diagnosed, only about 50% are ever treated (Whitney & Peterson, 2019) leading to high-risk behaviors and even death (Papachristou et al., 2018). Mental health encompasses psychological, emotional, and social wellbeing (Office of Disease Prevention and Health Promotion, 2020). As youth with mental health disorders grow older, the prevalence of mental health illness also increases (Ghandour et al., 2019; Mojtabai & Olfson, 2020), raising the likelihood of comorbidities, loss of earned wages, and substance abuse (NAMI, 2020). To address this expanding and complex mental health problem, researchers must look beyond the individual to the social determinants of health as potential points of a primary prevention intervention and as secondary or tertiary approaches for psychological restoration.

Aspects of the environment where people live, work, play, and worship are defined as the social determinants of health and have a significant impact on health outcomes across the lifespan (Office of Disease Prevention and Health Promotion, 2021). In an urban setting, the social determinants of the built environment and the social context contribute to “place-based” conditions of significant societal health outcomes, including mental health (Cresswell, 2013; Haase et al., 2014). Green space is part of the built environment and is loosely defined as parks, open grass-covered areas, tree canopy and or vegetation (Taylor et al., 2019), and has essential

benefits on physical, mental, and social wellbeing across the lifespan (Bezold et al., 2018; Dawson et al., 2019; Foster et al., 2017; Kondo et al., 2018; van den Bosch & Ode Sang, 2017). To date, research indicates that green space is an effective intervention for improving adolescent mental health, yet we still do not understand how this population uses it nor do we know how they feel when they are in it (Zhang et al., 2020). In the formative growth and development stages of adolescence, it is vital to explore how this population perceives such place-based relationships to gain a better understanding of the meaning of areas within the built environment, a key component in understanding how place relates to mental health as an intervention (Fleuret & Atkinson, 2007).

There is a need to focus on adolescent mental health given that these formative years give rise to the future health of a population. Lack of prevention or utilizing a useful intervention has lasting effects on an individual, and impacts families, friends, and society as a whole. From an economic standpoint, mental disorders, combined with substance and neurological sequelae, leave a projected cumulative global economic impact of $16.3 trillion by the year 2030 (Knapp & Wong, 2020). This global burden of disease far exceeds major chronic illnesses such as cardiovascular disease, chronic respiratory disease, cancer, and diabetes (Knapp & Wong, 2020). What is needed is further research to understand how an intervention such as green space is used to enhance mental health wellbeing in adolescents. How and why these spaces are used will support evidence for improvement, integration, and expansion of green space and also sustainability of green space in urban environments(Collins et al., 2020).

The Primary Investigator (PI) conducted a focused mini ethnography to explore the perceptions of urban green space with residents of an urban community. Two preliminary patterns were discovered: changes in the community and neighborhood structure impacting

lifestyle and recreation, and safety impacting accessibility and use of green space in an urban setting.

The proposed qualitative study will build upon the PI's investigation of green space perceptions within an urban community; however, the focus will be on the adolescent population. Adolescence is a time of transition that involves multiple domains of functioning that include physical, psychological, and biological aspects (Quas, 2014). The malleability of this developmental period is an avenue to implement interventions such as green space to mitigate mental health disorders (Engemann et al., 2019). Without understanding how and why this intervention is used by this age group, we do not fully understand how adolescents feel when they are in green space nor do we understand if the intervention itself needs improvement (Zhang et al., 2020). Therefore, this proposal will generate knowledge about youth perceptions and feelings of the intervention of how and why they use green space.

Using a focused ethnography within youth aged 12-16 will add to the science to help explore place-based relationships as they relate to adolescent mental wellbeing. The PI will meet with a community leader/gatekeeper of the Boys and Girls Club in Newark, NJ. Recruitment and interviews will take place within this community establishment. The proposed study will consist of auto photography and participant photo-elicitation using semi-structured interviews with adolescents residing in or near Newark, NJ.

The proposed research questions are:

1. Why do adolescents use green space?
2. How do adolescents use green space?
3. How do adolescents feel when they are in green space?

Significance

Prevalence and Impact of Adolescent Mental Health Disorders

Yearly, 16.5 % of adolescents aged six to 17 experience a mental health disorder (Whitney & Peterson, 2019). Since most mental health disorders arise during childhood and adolescence, early assessment and intervention are needed. It is well documented that untreated mental health at an early age is associated with long-term, comorbid conditions and increased health care costs into adulthood (Sporinova et al., 2019; Whitney & Peterson, 2019). Physically, those with mental health disorders are at an increased risk to develop chronic diseases such as heart disease, cancer, diabetes, and chronic obstructive pulmonary diseases (Daré et al., 2019(Firth et al., 2019). Furthermore, the younger the onset of mental health disorders, the greater the likelihood of cognitive decline through adulthood (Caspi et al., 2020), which perpetuates the cycle of aforementioned consequences.

Literature highlights that mental health disorders increase the likelihood of comorbid conditions in adulthood, but they also affect adolescent quality of life (Foy et al., 2019). Unfortunately, mental health disorders, such as a major depressive episode, are on the rise in the United States (U.S.) with 126,000 more youths experiencing an episode in 2021 compared to 2020 (Mental Health America, 2021). Of those who have a mental health disorder, one in three adolescents are not seeking treatment even when access to care is readily available (Mental Health America, 2021). Even more alarming is that according to the Centers for Disease Control and Prevention (2019), suicide was the second leading cause of death among individuals between the ages of 10 and 34.

Research on Adolescent Mental Health

Adolescent Mental Health and the Built Environment

According to Healthy People 2030, aspects of the environment where people live, work, play, and worship are defined as the social determinants of health and significantly impact mental and physical health outcomes across the lifespan (Núñez-González et al., 2020). Research demonstrates that addressing the SDOH can positively influence adolescent mental health in addition to personal and societal costs savings (Krist et al., 2019). As urbanization continues, more youth reside in areas reconfigured by the built environment (Vanaken & Danckaerts, 2018), which exposes this population to elements, such as higher rates of pollution, less open space, and safe areas to congregate (Gruebner et al., 2017). Where adolescents reside could contribute to a lack of health-protective factors, such as community support, physical activity, and social cohesion (Frank et al., 2019; Núñez-González et al., 2020; Rautio et al., 2017). In the formative growth and development stages of adolescence, it is vital to explore how and why this population utilizes place-based relationships to better understand the impact on mental health outcomes.

Green space has significant benefits on adolescent mental health. To date, the studies that explore adolescent exposure to green space have generally reported positive mental health outcomes (Frank et al., 2019; Zhang et al., 2020).

In 2009, a landmark study in the Netherlands explored the association of all age groups living in a green environment and their health, measured by primary care diagnoses. The authors concluded that children had fewer mental health disorders when they lived in and were exposed to greener environments (Maas et al., 2009).

Other studies have reported correlations between green space exposure and reduced violence, mental fatigue, and stress (Bhui, 2018; Engemann et al., 2019), and greater social cohesion within the community (Child et al., 2016; Jennings & Bamkole, 2019; Lin et al., 2017;

Wickes et al., 2019). These are important points to review since the built environment can be a positive intervention for mental health (Bosch & Meyer-Lindenberg, 2019; Núñez-González et al., 2020).

Research on Urban Green Space

Green Space in Urban Settings

Within the urban setting, green space is not ubiquitous, and it likely varies with what it offers in terms of amenities. Green space may lack safety or facilities that make it less appealing for adolescents to use, negating the benefits that a green space intervention could impart (Dias et al., 2019; Mertens et al., 2019; Van Hecke et al., 2016). To highlight this point, if green spaces offered structured play or work out facilities, such as basketball courts, tennis courts, biking, and well-lit walk/run paths, they are more likely to be accessed by adolescents (Boone-Heinonen et al. 2010; Mertens et al. 2019). Unfortunately, most studies have not explored how adolescents feel about green space when they are using it, which is an important consideration for designing and or improving the quality of green spaces.

Green space can act as a conduit for building and strengthening peer relationships, as well as social cohesion, since most adolescents and young adults report that they visit green space with friends/classmates, followed by siblings, parents, or alone (Van Hecke et al., 2018). The more time spent using green spaces for recreational activities such as walking or "hanging out" has been associated with a higher likelihood of having three to more close friends (Dadvand et al., 2019; Van Hecke, Deforche, et al., 2016). Findings from these studies support green space as an intervention to strengthen peer relationships, which is a protective factor for mental health disorders (Moses & Villodas, 2017).

Social Determinants of Health Framework

Adolescence is a crucial period where multiple social determinants can intersect and contribute to developing a mental health disorder (Alegría et al., 2018). A social determinants framework will guide this study to explore how the circumstances in which adolescents live, work and play influence their mental health outcomes. This framework's premise is scaffolded on social gradations, whereby the more significant the disparity is, the poorer the health outcomes that result (Alegría et al., 2018). Housed within this framework are five domains: economic stability, education, social and community context, health and health care, neighborhood, and built environment (Office of Disease Prevention and Health Promotion, 2021).

This proposed study will focus on the adolescent use of the built environment. The built environment encompasses structures that provide people housing, employment, and recreation, such as green space. (Office of Disease Prevention and Health Promotion, 2021). Factors of green space are important because they are intertwined within the quality of the built environment (Jennings & Bamkole, 2019; Park, 2020). How adolescents use these spaces and feel when they are in them are facets that are overlooked in many existing studies (Slater et al., 2016; Van Hecke, Van Cauwenberg, et al., 2016).

This researcher will use a focused ethnography to address questions surrounding how and why adolescents use green space as an intervention. Ethnography provides the foundation for building upon clinical knowledge applicable to developing practice science (Thorne et al., 1997). Gaining insight into an adolescent's perceptions will help answer complex research questions about how they use this resource and what they feel while doing so. This is important to understand if we as researchers continue to state that green space is a restorative intervention for mental health.

The Unheard Voice of Adolescents

Adolescent mental health is a crisis in the U.S. and there are aspects of residing in an urban area that places youth at a greater risk for developing lifelong consequences of comorbid conditions (Buttazzoni et al., 2021). A majority of studies measuring green space in adolescents are focused on physical activity as a barometer of health (Andersen et al., 2017; Dias et al., 2019; Holt et al., 2019; Mertens et al., 2019; Linde Van Hecke et al., 2018) and others highlight that the quality of green space influences use (Bloemsma et al., 2018; Edwards et al., 2015; Oreskovic et al., 2015; Van Hecke, Van Cauwenberg, et al., 2016), yet asking how and why adolescents use green space is left out.

In a study by Gallerani et al., (2017), adolescents reported that they were not asked about their attitudes or recommendations about green space plans or needed improvements in existing green space. It was only when they were part of a research study that they either became aware of what green space was or were given the platform to voice their opinions. Input from this demographic is essential since adolescents interact with the built environment much differently than a toddler or an octogenarian. Empowering adolescents to voice their perceptions about green space provides a unique opportunity for nurses and other health care professionals, urban planners, members of the community, and policymakers to listen and find out if green space is adequate as a prevention effort to mitigate mental health disorders or if the intervention of green space can be improved to meet the needs of this population. In addition, this proposed study will increase adolescent awareness of what green space is and is not, which may plant the seed for environmental stewardship for generations to come and negate upstream causes of place-based concerns (Sullivan et al., 2020).

Improving Adolescent Mental Health Through Nursing Research

The concept of the environment remains central to what we as nurses focus on in research and practice. As such, nurses play a vital role in all levels of prevention in adolescent mental health and incorporating social determinants in research is relevant to generate evidence as a lever for advocacy and change within this vulnerable population. As advocates of health, nurses strive to facilitate empowerment by forming trusting relationships, actively listen and promote autonomy (Jerofke-Owen & Bull, 2018), which is crucial in the context of adolescent development. Nurses are well suited to bridge the research gap between adolescent mental health and built environment as a successful intervention.

Innovation

Green space exposure has an association with improved mental health in adults (Beemer et al., 2021; Kondo et al., 2018; Moore et al., 2018). It is being used as an environmental-level intervention to promote population mental health; still, adolescents have largely been excluded from these efforts. Moreover, the sparse prior research that has been conducted leaves a gap in how adolescents perceive and use green space. The proposed study demonstrates innovation in three ways.

First, this study takes a novel direction by including adolescent perspectives on urban green space and its use. Research in this area is limited with much of the existing studies using quantitative methodologies (Andersen et al., 2017; Dias et al., 2019; Holt et al., 2019; Mertens et al., 2019; Van Hecke et al., 2018). This method, while applicable, restrains the context of what constitutes green space and if it is perceived as a valuable intervention by adolescents. If adolescents are reluctant to use green space, we should be cognoscente as to why. If adolescents use green space, we should know how and why they use it and what they feel when they are in that space. These missing cornerstones are needed to support whether green space is a valuable

intervention for adolescent mental wellbeing. This study will empower adolescents to provide their perspective on the built environment with which they interact. Empowering community members strengthens social cohesion and invigorates a sense of pride within the community (Jennings et al., 2017).

Second, this study will use autophotography and participant photo elicitation to capture participants' realities in the environment they live. The use of autophotography and photo elicitation transcend cultural and linguistic barriers that may be evident in other methodologies and helps promote communication between the participant and the researcher (Mukumbang & van Wyk, 2020). As such, this study generates new knowledge about adolescent perception of green space and use, opening the door for multidisciplinary collaboration on future research, changes in clinical practice, and policy changes.

Third, using a SDOH framework, this proposed study will focus on the neighborhood and built environment domain as they contribute to the place-based relationship of mental health in the adolescent population. It has been eight years since Hazel Dean, the Deputy Director of National Center for HIV/AIDS, Viral Hepatitis, STD, and T.B. Prevention (NCHHSTP), wrote an editorial stating that there is a substantial body of evidence that supports the relationship between social determinants of health and many different health outcomes (2013), yet we are still faced with health inequity and disparity on all levels of determinants. Bringing attention to health disparity is paramount for change and sustainability to occur, and little has been researched on the determinant of the built environment and adolescent mental health (Franklin et al., 2020).

Approach

Preliminary Work

A prior focused ethnography was the foundation for this proposal. The purpose of the preliminary study was to explore an urban community's perception of green space and how it was utilized, refine semi-structured interview techniques; and determine if a more extensive study was feasible. To be eligible for this study, participants had to be older than eighteen and reside in or around Newark, NJ. A gatekeeper was instrumental in securing voluntary participants for the study.

Three parents, self-identified as women aged 26, 32 and 45 years, living in or around Newark, New Jersey, participated in the study. Interview questions included aspects of what participants perceived green space to be and how it was accessed or utilized. Questions also focused on the neighborhood and built environment in which the participants resided. Using Leininger's (1997) ethnonursing method, the researcher collected data via face-to-face interviews held individually at an inner-city Boys and Girls club. Field notes were collected before, during, and after the interviews to describe participants' expressions, changes in position, and other observations that could not be audio recorded. This technique allowed the PI to explore the specific concept of green space within a focused field of inquiry, with a limited number of individuals within a culture (Streubert & Carpenter, 2011, pp. 42-43).

Voice recorded data were transcribed verbatim and entered into the qualitative data manager NVivo 12 (QSR International, 2018). Data analysis was modeled after Leininger's Four-Phase Analysis of Qualitative Data (Leininger, 2005; Wehbe-Alamah, & McFarland, 2015), resulting in ten categories and two preliminary patterns.

The two preliminary patterns identified in the data analysis included built environment: Changes in the community and neighborhood structure impact lifestyle and recreation and safety: Impact on accessibility and use in an urban setting. Participants shared concerns about the

changes they had experienced in their built environment, feeling forced out of their community because of safety issues or because the cost of living had increased.

The previous focused mini ethnography revealed preliminary findings that lay the foundation for a more extensive study using the same methodology. Specifically, changes in the built environment, such as development or less upkeep influenced lifestyle factors of walking in the neighborhood or visiting green space. Could these same factors affect participants' children in the same way? Adolescents may use the built environment to socialize and recreate (Jennings & Bamkole, 2019; L. Van Hecke et al., 2018), yet we still do not understand how adolescents perceive and respond to the places where they spend most of their time.

The proposed study will explore how adolescents perceive place-based relationships within the context of the built environment. Adolescents may be reluctant or unsure of how to answer semi structured interview questions, depending on their cognitive development (Glaw et al., 2017; Hieftje et al., 2014), thus using photographs, adds another dimension to interviews and field notes, which may otherwise been lost (Glaw et al., 2017).

Research Design

A focused ethnography will be conducted to identify new concepts from the participant's perspective (emic view) combined with the researcher's perspective (etic view). A focused ethnography aims to explore a specific concept with a focused field of inquiry and a limited number of individuals within a culture (Higginbottom et al., 2013; Streubert & Carpenter, 2011, pp. 171-172). Culture in ethnography is defined as a population in a natural setting (Schreiber & Asner-Self, 2010), and will include adolescents who live where urban green space is available or used. In ethnography, participants often have in-depth knowledge of a particular topic area of research because they are immersed within it. For this study, observation through auto-

photography and interviewing will be the primary methods for data collection. These data collection techniques are also in line with a focused ethnography (Higginbottom et al., 2013). The interview process combined with participant photo elicitation allows insight into the participants' worldview and is an excellent data source (Higginbottom et al., 2013; Streubert & Carpenter, 2011, pp. 34-37). Photographs transcend written and verbal responses and provide additional context to the data. In addition, this method has positive reception from adolescent participants in other studies (Lam et al., 2019; Sekaran et al., 2020; Tickle, 2019) and is an appropriate data collection method for adolescents to "voice" their perception.

During the interview, questions will focus on the photographs participants captured regarding green space in the urban setting. Initial research questions for the proposed study will include: How do you use green space? How do you feel when you are in green space?

Sample and Setting

Purposeful sampling will be used for this focused ethnography. This method of sampling selects individuals, adolescents of an urban setting, based on their particular perspective of the green space for the purpose of sharing that knowledge (Streubert & Carpenter, 2011, pp. 28-29). Inclusion criteria will include individuals residing in or around the city of Newark, NJ, who are proficient in English and between the ages of 12-16. Although a set number of participants is usually not predetermined (Higginbottom et al., 2013), it is anticipated that approximately 10 to 20 participants will need to be recruited to obtain data saturation (Schreiber & Asner-Self, 2010).

According to the U.S. Census (2019), Newark, NJ, a city within the county of Essex, is comprised of 24.1 square miles, of which, 803 acres are designated as green spaces. Newark is the most populated city in the state of New Jersey and fraught with many characteristics attributed to urbanized areas, such as crime and pollution. The setting of Newark's built

environment provides a backdrop for which to explore how adolescents perceive and respond to the place where they live and play.

Recruitment. Recruitment will be done at the Salvation Army Boys and Girls Club of Newark. This organization was utilized in the preliminary work and is known to the PI. This community center provides a multitude of services, including after-school programs, camps, senior activities, and sports organization activities. A gatekeeper within this organization will serve to help identify potential participants and refer them to the researcher by providing names and contact information. Internal Review Board (IRB) approved recruitment flyers will be posted within the Boys and Girls Club that outline the purpose of this study (Appendix A). The flyer announcing the study will have the PI's contact information so that potential participants can contact the PI.

Once the gatekeeper refers potential participants to the PI and they agree to be contacted, the PI will contact them via telephone or in-person at the Boys and Girls Club. Additionally, a potential participant who reads the recruitment flyer may contact the PI directly. During this initial encounter, the PI will answer any preliminary questions about the research study. In congruence with the Duquesne University's IRB code of ethics, informed consent by the parent/ guardian and assent by the participant will be obtained during a mutually agreed upon date and time prior to the point of participation. During this meeting, once consent and assent are obtained, general instructions, demographic forms, pre-paid envelopes, and disposable cameras will be handed out (Appendices B and C).

Data Collection and Analysis

Demographic form. During the first meeting, participants will complete an investigator-designed demographic form (Appendix B) that captures descriptive data relevant to the study's purpose. Factors included on the form include age, sex/gender, ethnicity, and education level.

Photography. Auto photography involves participants taking photographs of a topic of interest, in this case, green space. Auto photography as a data collection technique also transcends cultural and language barriers that may be apparent through other means of data collection, such as questionnaires or surveys (Murray & Nash, 2017). Participants knowingly photograph what they think is important to convey, and by doing so, exploration of subtle meanings can be undertaken during analysis (Glaw et al., 2017). This method will capture the individual's perception of green space and how they use it (Butz & Cook, 2017; Glaw et al., 2017; Murray & Nash, 2017). Participants will be given disposable cameras and asked to photograph what they perceive as green space and how they use it during a two-week time frame. This approach engages adolescents as active participants in the research process, which is vital to the specific aims. During the weeks that participants take photographs, they will also be asked to keep a journal or some form of notetaking, as a way to record any events/reminders about when or why they took the photographs. The journal is for participants' use only and can be brought to subsequent interviews to remind participants why or how they felt when they took a photograph. After participants have taken photographs, arrangements will be made for participants to return the disposable cameras to the Boys and Girls club or to mail cameras to PI in a self-addressed, prepaid envelope. The PI will develop the film, resulting in digital photographs, enabling ease of display and or editing when inadvertent photographs of people are taken without their consent. Once the photographs are developed by the PI, the PI will arrange a time/date to meet with individual participants at the Boys and Girls Club to discuss the captured

images. This visual methodology is known as participant photo-elicitation. Photo elicitation includes the use of photographs in conjunction with research interviews (Harper, 2002). Participant photo-elicitation empowers the participant to be an active, engaged member of the research (Van Auken et al., 2010).

A one-on-one interview at the Boys and Girls club will take place to discuss photographs about green space. The interview will allow for the PI to explore the participant's narrative and allows for an opportunity to ask follow-up and clarifying questions as needed (Noland, 2006).

Field notes. The PI will take field notes throughout this study which will include detailed observations gleaned from all data and will entail the PI's thoughts and feelings. This reflective practice is essential within focused ethnographies and provides another means to produce data that can be analyzed (Emerson et al., 2011; Pacheco-Vega, 2019).

Semi-structured interview guide. A semi-structured interview guide (Appendix D) will serve as a template for a series of open-ended questions that ask the participant to discuss the photographs with the PI. This approach will allow flexibility for the PI to pilot and tailor questions based on participant's responses (Streubert & Carpenter, 2011, p. 34). With the participants' permission, participants' responses will be audio-recorded to capture what is said accurately. This is to ensure that data will be transcribed verbatim (manually typed or by a transcription service).

Data Analysis

Inductive, latent thematic analysis will be used for analyzing data to gain a rich thematic description of the entire data set; see Figure 1. Using the six phases outlined by (Braun & Clarke, 2006), an analysis may appear to be a linear, phased activity; however, it is an iterative and reflective process that develops over time (Nowell et al., 2017). To address each of the specific

aims, first, the researcher will become immersed in the data from transcribed participant interviews related to photographs and their meanings. The PI will read and re-read the data, searching for meanings and patterns. The PI will keep notes on coding as this audit trail provides a template through which data analysis can be tested for adequacy at a later date (Lincoln & Guba, 1985). During the second phase, using NVivo12 software (QSR International), codes will be generated from the data. For phase three, once all the data are coded and categorized, potential themes will be identified. Essentially, codes will be reorganized and combined to develop overarching themes or subthemes (Braun & Clarke, 2006). During phase four, the PI will re-visit and revise themes based on data and determine if themes capture the specific aims of this proposal. Without enough data to support a theme, the PI will need to revise the theme, possibly combining it with another one, so that themes "fit" together like a story (Braun & Clarke, 2006). The PI will create a thematic map to illustrate how the data fit together. Once a map is created, the PI will enter phase five of thematic analysis and further refine each theme, providing names and giving explicit definitions of each. In essence, the themes will be like puzzle pieces that should fit together to display a final product, contributing to the final masterpiece in phase six. The final product is a reflection of validity or what inferences are made about the study's findings (Messick, 1989).

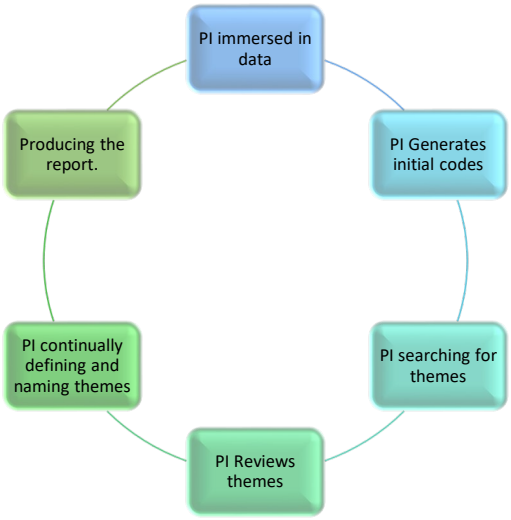

Figure 1. Phases of thematic analysis proposed for this study. *Notes:* Adapted from (Braun & Clarke, 2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77-101.

Study Limitations

Potential limitations include the setting where this proposed study will take place. Although many urban areas share common factors, each is unique in what attributes it contains and the demographic, with some offering greener spaces than others. The population of adolescents may not represent ages outside of this sample such as older adults and children, who also may use green space for other activities. Another potential limitation of this research is that photographs may be interpreted differently by the PI than the participants. To minimize this, the PI will interview participants after photographs are taken so that participants can explain what the photographs mean. Devices that allow photography are ubiquitous amongst this age group; however, not everyone may have access to or want to use their personal device for data collection. Furthermore, having participants use their personal devices to collect data could also cause increased data use. Thus, grant funding will be requested to support the use of disposable cameras as a visual methodology in this proposal. Photographs may inadvertently capture

persons who are unwilling or unknowingly photographed, and if consent for that photo is not obtained, it will need to be blurred for anonymity or deleted entirely.

The study's inclusion criteria exclude anyone who does not speak fluent English, and this might hinder generalizing the study's population focus and or negating cultural aspects that might provide richness to the data.

Potential Barriers and Solutions

Recruitment for this study is a potential hurdle since Covid-19 may limit interaction. Safety parameters regarding collection and handling data will be performed in line with Duquesne University's Internal Review Board on conducting research involving human subjects. The PI will adhere to guidelines set forth by the Centers for Disease Control and Prevention (2021) with respect to Covid- 19.

Ideally, an open, neutral space where interviews can be conducted will take place at Branch Brook Park Education Center in Newark, NJ. Within this facility, there is a room that is conducive to privacy. It is anticipated that a room will be available for individual interviews; however, if this is not feasible, the PI would need to arrange for alternate accommodations.

Trustworthiness, whereby the findings from this study are worthy (Nowell et al., 2017), will be modeled by what Lincoln & Guba, (1985) outlined as credibility, transferability, dependability, and confirmability. Credibility will be sought via triangulation. First, the PI will review and confirm findings from the different data sources. This aspect of method triangulation will support the consistency of findings (Patton, 2014; Rashid et al., 2019). Next, the PI will take analyzed data back to participants to ensure that data aligns with what was experienced by the participant. This will increase the overall quality and rigor of the study outcomes (Lincoln & Guba, 1985; Rashid et al., 2019). The credibility of this focused ethnography will rely on thick

descriptions, participants' voices, and stories in verbatim quotes, mediated by the researchers' interpretation (Geertz, 1973). Thick description is essential for understanding the intricacies of all possible meanings generated from the data and will provide a base for transferability for future researchers to build. The dependability of this study will rely on audit trails previously discussed. The transparency of the research process is essential for dependability. Finally, confirmability will be achieved if all other criteria, credibility, transferability, and dependability, are met (Guba & Lincoln, 1989).

Protection of Research Participants

In congruence with the Duquesne University's Institutional Review Board (IRB) code of ethics, informed consent will be obtained prior to initiating data collection. Information regarding the study is available any time before participation by directly contacting the PI Potential participants will learn about the entire study, including risks, benefits, and conditions of participation through the study information flyers and by contacting the PI. When an interested participant contacts the PI, the PI will prepare the participant for the actual meeting and answer any preliminary questions.

Participants will be informed from the beginning of, and be reminded throughout, the investigation that they have the right to withdraw from the research study at any time without negative consequences. Participants will be guaranteed confidentiality using pseudonyms and blurring any recognizable facial features in the photographs that are not consented to be displayed during the interview. This study poses minimal risk to potential participants. The probability and magnitude of harm or discomfort anticipated in the research is not greater than those ordinarily encountered in the daily life of a healthy person or during the act of taking photographs or participating in semi-structured interviews. No treatments will be given to any

participants participating in this proposal. The questions that the participants will be asked to answer relate to how and why they use green space. If an adverse event occurs, it will be reported to the IRB immediately. The decision to stop the study would depend on the circumstances and severity of the event.

The research study, protocols, and materials will follow the ethical guidelines and safety recommendations set forth in the Belmont Report. The researcher is well versed in the ethical guidelines used to ensure a proper research study and will maintain the highest standard of ethical conduct during the entire study. Data will come from the scheduled participant interviews. The data collected in this study will be analyzed by the PI and shared with the PI's research committee. All hard copy materials will be kept in locked cabinets in the locked PI's office. Electronic data will be housed on a password-protected, firewalled computer and media in the PI's office. Written and electronic data will be scrubbed of real names/nicknames and coded with I.D. numbers or pseudonyms. Consent forms (Appendix E) and assent forms (Appendix F) will be kept separate from written and electronic data, tapes, and transcripts. Participants will be supplied with information about the purpose and scope of the study, the types of questions that will potentially be asked, how the results will be used, and how their anonymity will be protected. All data (written, video, photograph, audio, and transcribed) will be shredded after three years in accordance with IRB policy. Data will be permanently erased from the hard drive, and if any external devices are used, they will be erased and securely destroyed. Verbatim transcription will be performed by the researcher; however, if a transcription service is used, services from Transcription Star will be utilized. They provide secure storage of the transcripts. The client area is encrypted with 256bit SSL encryption and password protected (Appendix G).

Participants will know during preliminary telephone discussion and prior to the start of

the interview that they have the right to withdraw from the research study at any time, even during the interview session, without negative consequences. Participant observation or the way they relate to each other will be gathered. All participants will be informed about the aims of the study and its procedures for transparency to achieve a greater likelihood of valid data. At the start of the interview, participants will be reminded by the PI of the following:

- Participation in the interview is voluntary.
- It is all right to abstain from discussing specific topics if you are not comfortable.
- All responses are valid—there are no right or wrong answers.
- Speak as openly as you feel comfortable.

Timeline

The timeline for this proposed study totals 10-12 months. The first month will include seeking approval from the Institutional Review Board (IRB) at Duquesne University. This proposed study is an expansion of the prior mini study approved in an expedited review; however, the proposed study seeks recruitment of adolescents, deemed a vulnerable population, and will require a full board review.

Once the study is approved by the IRB, recruitment of adolescents will begin. Instructions on how to use disposable cameras will begin at the first opportunity after informed consent and assent has been obtained. It is anticipated that recruitment, observations, and interviews will overlap. The researcher anticipates between three months to complete observations and interviews dependent on data saturation. Coding for patterns, and themes will begin with the first data gathered and will continue as an iterative process with each new data (Table 1.).

Table 1

Study Timeline 2022

Task	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
IRB approval	**X**											
Recruitment						**XXXXX**						
Observation						**XXXXX**						
Interviews							**XXXXXX**					
Analysis							**XXXXXXXXXXXXXXXXX**					
Dissemination												**X**

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Appendix A
Green Space Study

Participants Needed

Be a part of an **important** research study that wants to hear **your voice** on how and why you use green space!

- Are you between the ages of 12-18?
- Do you live nearby Newark NJ?
- Can you read and write English?

If you answered YES to any of these questions, you might be eligible to participate in this research study

- **WHAT will you be asked to do?**
  - Complete a short form asking information about your age, gender, ethnicity and education level.
  - Agree to be interviewed by the researcher for approximately 30 minutes
  - Take pictures of green space with a camera provided to you.
  - Light Refreshments will be served.
  - No cost to participate!
  - After returning camera, you will receive a $10 Amazon gift card ☺
  - After completing the study, you will receive a $10 Amazon gift card ☺
- **WHERE???**
- **Education Center at Prudential Concert Grove, Branch Brook Park Dr, Newark, NJ 07107**
- **QUESTIONS???**
- **Please contact the researcher, Rachel Lyons, at: Phone: 401-935-3192 or email lyonsr@duq.edu for more information**

Appendix B

Demographic Information Form

Instructions: Please provide a response for each of the following questions:

1. How old are you? ❑ Please specify: _____

❑ I prefer not to answer.

2. What gender do you identify with? ❑ Please specify: _____

❑ I prefer not to answer.

3. Highest grade of education completed or what grade are you in now: _____

4. Which categories describe you? Select all that apply to you:

❑ American Indian or Alaska Native—For example, Navajo Nation, Blackfeet Tribe, Mayan, Aztec, Native Village of Barrow Inupiat Traditional Government, Nome Eskimo Community

❑ Asian—For example, Chinese, Filipino, Asian Indian, Vietnamese, Korean, Japanese

❑ Black or African American—For example, Jamaican, Haitian, Nigerian, Ethiopian, Somalian

❑ Hispanic, Latino or Spanish Origin—For example, Mexican or Mexican American, Puerto Rican, Cuban, Salvadoran, Dominican, Columbian

❑ Middle Eastern or North African—For example, Lebanese, Iranian, Egyptian, Syrian, Moroccan, Algerian

❑ Native Hawaiian or Other Pacific Islander—For example, Native Hawaiian, Samoan, Chamorro, Tongan, Fijian, Marshallese

❑ White—For example, German, Irish, English, Italian, Polish, French

❑ Some other race, ethnicity, or origin, please specify: _____

❑ I prefer not to answer

Appendix C

Instructions

Pseudonym: _____

Take as many photographs that capture how and why you use green space and how you feel when you are in green space. It is important that you are the photographer. If possible, try not to take pictures of people's faces. You can use the notebook/journal we will provide you to write down any thoughts you have when taking pictures. After the two-week period, please drop off the camera at Branch Brook Park Education Center or send back in the self-addressed, prepaid envelop.

We will meet again for approximately an hour to talk about the photographs you shared and your ideas about green space on the following date _____ at _____am/pm. You can bring your notebook/ journal to help you remember why you took photograph. Please remember that your notebook/ journal is yours and I will not read.

Feel free to email me (lyonsr@duq.edu) if you need to change this date or time. Thanks!

Appendix D

Semi-Structured Interview Guide

Good afternoon, my name is Rachel Lyons, and I am a Ph.D. student currently enrolled at Duquesne University School of Nursing. This interview will explore your perspectives regarding green space. As a reminder, the interview will be audio-recorded and kept confidential. If you need to pause at any time, or if there is anything I can do to make you more comfortable, please do not hesitate to let me know.

1. Take a moment to reflect on the photographs in front of you (participant driven photographs placed in front of the participant and pause to provide time for the participant to re-examine).
    a. Tell me about your photographs.
    b. What do you want me to see about your photographs?
    c. What do you wish others noticed about you that may or may not be present in these photographs?
2. How did you or would you use green space in these photographs?
    a. Tell me what green space use means for you or how do you feel when you are in green space?
    b. What is left out about green space use in these photographs?
3. Where was the picture taken?
4. Can you tell me what comes to mind when you hear the words “green space”?
5. How close is green space from where you live?
6. Can you describe anything you would like to see in your community regarding green space?
7. What do you want to share that I didn't ask about during our time together?

Thank you for sharing your thoughts with me today and for participating in this interview.

Appendix E

Consent Procedures

DUQUESNE UNIVERSITY
600 FORBES AVENUE ♦ PITTSBURGH, PA 15282

Parental Permission Form

TITLE: The Relationship Between Urban Green Space Perception and Use Within the Adolescent Population

INVESTIGATOR: Rachel Lyons, DNP, CPNP-PC/AC, DCC
Nursing Ph.D. Student
Duquesne University School of Nursing
Phone: 973-655-3657
Cell: 401-935-3192
lyonsr@duq.edu

ADVISOR: Dr. Alison M. Colbert, Ph.D., PHCNS-BC, FAAN
Duquesne University School of Nursing
600 Forbes Avenue
Pittsburgh, PA 15282
Phone: 412.396.1511
colberta@duq.edu

SOURCE OF SUPPORT:

This study is being performed as partial fulfillment of the requirements for a doctoral degree in nursing at Duquesne University.

STUDY OVERVIEW:

The purpose of this study is to explore the adolescent perception of green space. While emerging research has demonstrated mental health benefits from exposure to open green areas or green space, little is known about how adolescents perceive and use green space. For those living in an urban setting, green space may be scarce, difficult to access, or underutilized. The primary aim of this study is to explore how adolescents perceive and use green space in an urban area.

PURPOSE:

Your child is being asked to voluntarily participate in a research project that is investigating their perception of what green space is. Before you give permission to allow them to take part in this study, you need to understand the risks and benefits so that you can make an informed decision, known as informed consent. This consent form provides you with information about the research study that will be explained to you. Once you understand the study, you will be asked to sign this form if you grant permission for your child to take part in this study.

Your child is being asked to participate in this research study because they are between 12 and 18 years of age, live in or around Newark, NJ, and can read and write English.

PARTICIPANT PROCEDURES:

If you provide your consent to participate, your child will be asked to:

Meet with the researcher at the Branch Brook Park Alliance Education Building, Prudential Concert Grove, Branch Brook Park Dr, Newark, NJ 07107

Take photographs of green spaces and how they use them. Devices that allow photographs (disposable cameras) will be given to your child.

In addition, your child will be asked to allow me to interview them. The interviews should last between 30- 60 minutes. Your child will be asked to talk about the photographs that they took. The interviews will be recorded with audio or sound only and transcribed. Your child may be asked to a follow-up interview to clarify points made in the initial interview. This follow-up interview would also be audio-recorded and transcribed as well.

RISKS AND BENEFITS:

This study poses minimal risk to potential participants. The probability and magnitude of the harm or discomfort anticipated in this research study are not greater than those ordinarily encountered in the daily life of a healthy adolescent or during the performance of semi-structured interviews. The questions that the participants will be asked to answer relate to their perceptions of green space. Benefits of participant photo elicitation and auto-photography may spur greater awareness and community engagement regarding the built environment.

CONFIDENTIALITY:

Your child's participation in this study, and any identifiable personal information they provide, will be kept confidential to every extent possible and will be destroyed three years after the data collection is completed. Your child's name will never appear on any survey or research instruments. All written and electronic forms and study materials will be kept secure. Only members of the research team will have access to the data collected during this study. All hard copy materials will be kept in locked cabinets in the locked researcher's office. Electronic data will be housed on password-protected, firewalled computers and media in the researcher's office. Written and electronic data will be scrubbed of real names/nicknames and coded with I.D. numbers or pseudonyms. Consent forms will be kept separate from written and electronic data, tapes, and transcripts. All materials will be kept in locked cabinets in the locked researcher's office. Electronic data will be housed on password-protected, firewalled computers and media in the researcher's office.

In addition, any publications or presentations about this research will only use data that is combined with all subjects; therefore, no one will be able to determine how your child responded.

RIGHT TO WITHDRAW:

Your child is under no obligation to start or continue this study. Your child can withdraw at any time without penalty or consequence. Their responses will be deleted permanently and not added to the research data.

SUMMARY OF RESULTS:

A summary of the results of this study will be provided at no cost. You may request this summary by contacting the researcher and requesting it. The information provided to you will not be your child's individual responses but rather a summary of what was discovered during the research project as a whole.

FUTURE USE OF DATA:

Any information collected that can identify your child will not be used for future research studies, nor will it be provided to other researchers.

VOLUNTARY CONSENT:

I have read this informed consent form and understand what is being requested of me. I also understand that my child's participation is voluntary and that my child is free to withdraw at any time, for any reason, without any consequences. Based on this, I certify I am willing to consent to my child participating in this research project.

I understand that if I have any questions about my child's participation in this study, I may contact Rachel Lyons at lyonsr@duq.edu or via telephone 401-935-3192 or Dr. Alison Colbert, Associate Professor, via Phone: 412.396.1511 or email: colberta@duq.edu, If I have any questions regarding my rights and protections as a subject in this study, I can contact Dr. David

Delmonico, Chair of the Duquesne University Institutional Review Board for the Protection of Human Subjects at 412.396.1886 or at irb@duq.edu.

_____	_____
Parent/ Guardian Signature	Date
_____	_____
Researcher's Signature	Date

Appendix F

DUQUESNE UNIVERSITY

600 FORBES AVENUE ♦ PITTSBURGH, PA 15282

CHILD'S AGREEMENT TO PARTICIPATE IN A RESEARCH STUDY

TITLE: The Relationship Between Urban Green Space Perception and Use Within the Adolescent Population

WHO IS DOING THE RESEARCH?

RESEARCHER: Rachel Lyons, DNP, CPNP-PC/AC, DCC
Nursing Ph.D. Student
Duquesne University School of Nursing
Phone: 973-655-3657
Cell: 401-935-3192
lyonsr@duq.edu

ADVISOR: Dr. Alison M. Colbert, Ph.D., PHCNS-BC, FAAN
Duquesne University School of Nursing
600 Forbes Avenue
Pittsburgh, PA 15282
Phone: 412.396.1511
colberta@duq.edu

WHO IS PAYING FOR THIS RESEARCH?

Not Applicable

WHY ARE THE RESEARCHERS DOING THIS STUDY?

We are asking you to take part in a research study because we are trying to learn more about how you use green space where you live. Green space is often referred to as parks or grass covered areas.

In order to participate, you must be:

Between the ages of 12 and 18.

Be able to read and write English.

Live in or near Newark, NJ

STUDY OVERVIEW:

The purpose of this study is to explore your perception of green space. You may have heard of being outside in green space or open green areas, yet little is known how you, the adolescent uses and feels while in these spaces. Therefore, the primary aim of this study is to explore how adolescents perceive and use green space in an urban area.

WHAT DO YOU HAVE TO DO?

The things you will be asked to do in this study are:

- Meet with the researcher (or "me") at the Education Center at Prudential Concert Grove, Branch Brook Park Dr, Newark, NJ 07107 to provide information about the study.
- This will be where a camera and instructions are given to you.
- Take photographs of green spaces and how you use them over a 5-week time period. Disposable cameras will be given to you.
- Mail the disposable camera back to me using prepaid envelope given to you today OR drop the disposable camera off at the Education Center at Prudential Concert Grove, Branch Brook Park Dr, Newark, NJ 07107.

- Once the photographs are developed by me, I will call you and we can arrange a time when I can interview you. The interviews should last between 30-60 minutes. You will be asked to talk about the photographs that you took. The interviews will be recorded with audio or sound only and transcribed.
- You may be asked to a follow-up interview to clarify points made in the initial interview. This follow-up interview would also be audio-recorded and transcribed as well.

HOW LONG WILL YOU BE IN THE RESEARCH STUDY?

You will be asked to take photographs during a 5-week period and then either drop off the camera or mail it using the prepaid envelope.

Once photographs are developed, I will contact you, using the contact info you provided to me to set up an interview day/ time at the Education Center at Prudential Concert Grove, Branch Brook Park Dr, Newark, NJ 07107

IS THIS STUDY HARMFUL? HOW IS IT HELPFUL?

We do not believe that you will be hurt or upset by being in this study. If you take part in the study and believe that you have been hurt or upset in any way, you may stop being in the study.

WILL YOU GET PAID TO DO THIS STUDY?

A $10 Amazon gift card will be given to you when you return the camera and another $10 Amazon gift card will be given to you at the very end for participating in this study.

ARE OTHER PEOPLE GOING TO KNOW WHAT YOU DID OR SAID?

I will keep what you say and do confidential.

If we find useful information in our research, we will want to share it with others, either by writing a paper about it, or talking about it with other professionals. If we do this, we will never

give out your name or talk about you in a way that someone could figure out who you are or what you said in the research. If there are other things during the research that have your name on them, we will keep them locked in a password protected file or a locked filing cabinet for three years, then we will shred them or delete them off of our computer.

When we type the interviews, we will use that secret code (pseudonym) instead of names, so no one will know what you said except us. After we type the video/audio recorded interviews, we are going to erase them off the recording device (e.g., camera, iPhone, etc.).

There is one exception to confidentiality that would be made aware to participants. As a mandated reporter, it is the PI's ethical responsibility to report situations of child abuse, child neglect, or any life-threatening situation to appropriate authorities. However, this study is not seeking this type of information, nor would participants be asked questions about these issues.

CAN YOU QUIT IF YOU WANT?

Yes. You don't even have to start if you don't want. If you do start, and decide you don't want to do it anymore, just tell the researcher, or tell one of your caregivers/parents so, they can tell us. Don't worry; no one will be mad at you if you decide to stop. If you decide to stop, you can tell us if we can use any information, we already got from you, or you can have us delete it all. It's up to you.

CAN YOU HEAR ABOUT WHAT HAPPENED?

After the study is completely over, the researchers have to get all of the information together and look at it. Once we do, we will type up a paper about it, and you can have a copy of our paper if you want. Just let us know that you would like to have a copy of it, and we will provide it to you for free.

WHAT WILL HAPPEN TO THE INFORMATION I PROVIDE?

Any information collected that can identify you, meaning people can figure out who you are (last names, address, etc.), will not be used for future research studies, nor will it be provided to other researchers.

OK, WOULD YOU LIKE TO DO IT?

If you read and understood everything on this assent form, and you understand that you don't have to participate if you don't want to, and can quit anytime you want, then please sign your name below. This means you are ready to participate. If you still have questions, you can ask them by calling me (Rachel Lyons) at 401-935-3192 or via email at lyonsr@duq.edu. If you have questions regarding how you are protected in the study, then the best person to contact would be Dr. David Delmonico, Chair of the Duquesne University Institutional Review Board, at 412.396.1886.

Participant's Signature Date

_____ _____

Researcher's Signature Date

_____ _____

Appendix G

Transcript Star (Transcription Services)

We strictly follow HIPAA guidelines and sign a Non-Disclosure-Agreement with our clients. Our secure servers use 256-bit Advanced Encryption Standard for file storage and Secure Sockets Layer / Transport Layer Security for file transits. At the end of every project, all files are deleted, including backups.

https://www.transcriptionstar.com/audio-transcription/

Appendix H

DUQUESNE UNIVERSITY – INSTITUTIONAL REVIEW BOARD

Protocol Amendment IRB Submission Form

Principal Investigator: ____Rachel Lyons_____Protocol # 2021/09/1

Type of Review Required for Original Submission (exempt, expedited, full board, program evaluation)

___Full_____

Date: _____6/23/2022

Phone: ___4019353192_____ e-mail: ___lyonsr@duq.edu_____

Protocol Title: The Relationship Between Urban Green Space Perception and Use Within the Adolescent Population

Co-Investigators or Student Investigator _____ Phone:

(In order for the IRB to fully evaluate an amendment to your originally approved protocol, you will need to provide a summary of the modifications you propose below. In addition, please provide your Protocol Summary with any changes highlighted and original consent form if applicable. Note that any modifications to the protocol cannot be implemented until after final IRB Approval is received.)

I. Check all protocol amendments that apply:

X Change in Protocol

X Inclusion/Exclusion Criteria Change

☐ New Information Provided to Subjects

☐ Therapy Changes

☐ Scientific Changes

☐ Advertisement(s)/Recruitment Letter (s)

☐ HIPAA research authorization forms

☐ Instruments (e.g., questionnaires or surveys)

☐ Change in Title

☐ Change in Investigators *(Submit CITI certificate for additional investigators)*

II. Attach a description of amendments and anticipated effects on subjects and potential subjects

1. Describe the proposed amendments and explain how they differ from the original approved protocol.

   The location of recruitment and where interviews will take place has changed from 11 Providence St Newark NJ 07105 to Education Center at Prudential Concert Grove, Branch Brook Park Dr, Newark, NJ 07107 to provide information about the study.

2. Explain why you propose to make the amendments.

   The amended location from March 1, 2022 (Boys and Girls Club Newark Nj, 11 Providence St Newark NJ 07105) has not had any potential participants sign up. I have met with key stakeholders at the new location (Branch Brook Park Alliance, Education Center at Prudential Concert Grove, Branch Brook Park Dr, Newark, NJ 07107) and they have agreed to allow recruitment during their youth workforce program that runs for 5 weeks in the summer months starting July 18, 2022. Since this population includes ages up to 18, I have amended the protocol and consent forms to include this age.

3. Describe any anticipated effects on subjects or potential subjects.

   No change

4. Include all documents in which wording will be changed in accordance with the amendments (such as consent form, recruitment materials, survey materials. All documents should be submitted in Word if possible).

3.0 RESULTS MANUSCRIPT

Manuscript #2

THE RELATIONSHIP BETWEEN URBAN GREENSPACE PERCEPTION AND USE WITHIN THE ADOLESCENT POPULATION: A FOCUSED ETHNOGRAPHY

Abstract

Introduction: Greenspace is beneficial for improving adolescent mental health, yet we still do not understand the connection between the built environment and subjective mental wellbeing. We also lack understanding of how this population uses greenspace and how they feel when in it. **Purpose:** The purpose of this qualitative study was threefold: to understand why adolescents use greenspace, to identify how they use greenspace, and to explore how they feel when they are in greenspace. **Methods:** participated in a focused ethnography that utilized auto photography for photo elicitation. Braun and Clark's (2006), six phases of thematic analysis were used to guide data collection and analysis. **Results:** Eleven adolescents between ages 12 and 18 who resided in and around Newark, NJ, were recruited. Three themes were identified from the data: 1) A tranquil space in an unsafe place; 2) Park means family connection with burgeoning independence; and 3) My park: Sense of ownership and responsibility. **Conclusions:** This study deepens the understanding between subjective mental wellbeing and urban greenspace exposure. The accepted responsibility that adolescents voiced toward maintaining "my park" strengthens community cohesion, detailing the importance of youth input during urban planning. **Clinical Relevance:** Implications from this study suggest that environmental interventions may help ameliorate an ongoing mental health care crisis. Healthcare providers should consider the built environment as another approach to promoting mental health.

Keywords: urban greenspace; parks; adolescent; emotional regulation, mental health

Introduction

In the United States, one in seven adolescents experiences a mental health disorder, with 50 % occurring before age 14 (National Alliance on Mental Illness, 2020; Whitney & Peterson, 2019). While this health crisis costs nearly $150 billion (Konnopka & König, 2020), a more significant concern is that only about 50% of the 7.7 million who are diagnosed are ever treated (Whitney & Peterson, 2019), leading to high-risk behaviors and even death (Papachristou et al., 2018). The impact of developing a mental health disorder transcends the developmental stage of an adolescent, increasing the likelihood of comorbidities, substance abuse, and lost earned wages

into adulthood (Ghandour et al., 2019; Mojtabai & Olfson, 2020; National Alliance on Mental Illness, 2020). From an economic standpoint, by 2030, mental disorders, substance abuse, and neurological sequelae will leave a projected cumulative global economic impact of $16.3 trillion (Knapp & Wong, 2020). This global disease burden of mental health illness far exceeds major chronic illnesses such as cardiovascular disease, chronic respiratory disease, cancer, and diabetes (Knapp & Wong, 2020).

There is a significant amount of literature that details adolescence as a vulnerable, critical period of development. During this developmental period, formal operations, abstract thought, and emotional regulation take shape, all necessary for a successful transition into adulthood and wellbeing across the lifespan (De Berardis et al., 2020; Graf et al., 2021; Theurel & Gentaz, 2018). Studies have linked deficits in emotional regulation, or the inability to manage emotions in order for adaptive functioning to take place, with poor mental health (McLaughlin et al., 2011).

Factors that can alter emotional regulation, or the ability to change or regulate emotions (Gross, 2014), are inherent to the new demands an adolescent faces; a new job, entry into a different grade, high regard for peer relationships, and reduced dependency on family (Young et al., 2019). Residing in an urban environment may also have a greater potential to expose adolescents to increased violence, noise and air pollution and stress (Engemann et al., 2019). As such, the delicate balance of becoming independent and coping with new challenges can create a heavy burden on how this population regulates emotions in response to stress, increasing the likelihood of mental health illness (Young et al., 2019). Research posits that when negative emotions cannot be regulated,

such as in stressful situations, a negative imbalance can contribute to mental health problems (De Berardis et al., 2020; McLaughlin et al., 2011).

To date, an increasing amount of research exploring the associations between greenspace exposure and other health outcomes has been published, most of which attribute greenspace to reduced violence, mental fatigue, reduction in stress, and greater social cohesion within the community (Engemann et al., 2019; Jennings & Bamkole, 2019; Kimpton et al., 2017; Lin et al., 2017; Lyons et al., 2021; McCormick, 2017; Vanaken & Danckaerts, 2018; Wickes et al., 2019). There is also increasing evidence to support that urban greenspace exposure has a greater impact on wellbeing than in less urban areas (Browning et al., 2022). Since mental health encompasses psychological, emotional, and social wellbeing (Office of Disease Prevention and Health Promotion, 2020), and there are documented mediating effects from greenspace exposure (Vanaken & Danckaerts, 2018), a potential point of intervention to enhance emotional regulation and thereby mental health, may be the built environment of greenspace (Bratman et al., 2021).

While much of the literature indicates that greenspace is beneficial for improving adolescent mental health, we still do not understand the connection between the built environment and why adolescents use it (Mouratidis, 2021; Vanaken & Danckaerts, 2018). Additionally, we lack an understanding of how this population uses greenspace and how they feel when in it (Zhang et al., 2020). Input from this demographic is essential since adolescents interact with the built environment much differently than a toddler or an octogenarian (Lyons et al., 2021; Sullivan et al., 2020). Therefore, the purpose of the study was threefold: 1) to understand why adolescents use greenspace, 2) to identify how adolescents use greenspace, and 3) to explore how adolescents feel when they are in greenspace.

Materials and Methods

Design

This study utilized a focused ethnography method to identify new concepts from the participant's perspective (emic view) combined with the researcher's perspective (etic view) (Streubert & Carpenter, 2011, p.172). A focused ethnography aims to explore a specific concept with a focused field of inquiry and a limited number of individuals within a culture (Higginbottom et al., 2013; Streubert & Carpenter, 2011, p. 172). Culture in ethnography is defined as a population in a natural setting (Schreiber & Asner-Self, 2010) and includes adolescents who live where urban greenspace is available or used. In ethnography, participants often have in-depth knowledge of a particular topic area of research because they are immersed within it.

Photo elicitation was also conducted within this focused ethnography. Visual methodologies, such as photo elicitation, produce verbal discussion to create data and knowledge (Glaw et al., 2017), whereby photographs are either taken by the researcher or the participant, to generate discussion during interviews (Harper, 2002). Photographs act as a connection for both the participant and the researcher because interpretation is rooted in images (Harper, 2002). Empowering adolescents to voice their perceptions about greenspace using their own photos during individual interviews provides a unique opportunity for researchers to gain a deeper understanding of the phenomenon of interest (Ford et al., 2017).

The interview process combined with participant photo elicitation allows insight into the participants' worldview and is an excellent data source from a population that might otherwise not be heard from (Higginbottom et al., 2013; Streubert & Carpenter, 2011, p. 172).

Sample and Setting

A purposeful sampling strategy was used to recruit 11 adolescents aged 12-18, who lived in or near Newark, NJ and were proficient in English. Recruitment took place near a youth program that focused on developing critical workforce skills. A gatekeeper, the Chief Operating Officer of a regional youth workforce program, helped identify potential participants. IRB-approved recruitment flyers were posted in the areas where potential participants gathered for their youth program. The flyers were also taken home to a caregiver/parent/guardian. The caregiver/parent/guardian filled out the contact information sheet and returned it to the gatekeeper, who then provided the information to the PI.

Once the caregiver/parent/guardian filled out the contact information, the PI contacted interested participants via telephone, email or in person at the site where the youth program met. During this initial encounter, the PI answered preliminary questions about the research study. In congruence with Duquesne University's IRB code of ethics, informed consent by the parent/guardian and assent by the participant was obtained during a mutually agreed upon date and time prior to the point of participation. During this meeting, once consent and assent were obtained, general instructions on how and when to use disposable cameras, demographic forms, pre-paid envelopes, and one disposable camera with 27 exposures were handed out. A signed copy of the consent and assent forms was provided.

Data Collection

The primary modes of data collection were observation through auto-photography, photo elicitation and interviews. Data were collected over a five-week period during the summer months.

Photo Elicitation

Photographs transcend written and verbal responses and provide additional context to the data. This method has had a positive reception from adolescent participants in other studies (Lam et al., 2019; Sekaran et al., 2020; Tickle, 2019) and is an appropriate data collection method for adolescents to "voice" their perception.

Participants were given disposable cameras and asked to photograph what they perceived as greenspace and how they used it. During the five-week youth program, participants took photographs, and kept a journal as a way to record any events/reminders about when or why they took the photographs. The journal was for participants' use only and was brought to subsequent interviews to remind participants why or how they felt when they took a photograph. The PI developed the film, producing digital photographs, which enabled ease of display and/or editing when inadvertent photographs of people or inappropriate photos are included.

Interviews

The 'emic' portion of this focused ethnography was obtained through semi-structured interviews, whereby the principal investigator (PI) met with participants individually for roughly 30 minutes. Once the photos were developed, the PI arranged a time/date to meet with individual participants face-to-face. That meeting included a semi-structured interview which included a series open-ended questions asking the participant to discuss the photographs with the PI. Open-ended questions enabled participants to share their beliefs, values, and experiences related to how they utilized greenspace and how they felt when they were in greenspace. For example, participants were asked how they felt when they were in greenspace and to describe what they wanted to convey in their photographs. This approach allowed the PI to pilot and tailor questions based on participants' responses (Streubert & Carpenter, 2011, p. 34). With the participants'

permission, participants' responses were audio-recorded to capture what was said accurately, ensuring that data was transcribed verbatim by the PI. Demographic data were collected to capture descriptive data relevant to the study's purpose. The form includes age, sex/gender, ethnicity, and education level. A $10 US dollar Amazon gift card was given when the camera was returned to the PI. A second $10 US dollar Amazon gift card was given to participants at the very end for participating in this study.

Observation

The researcher's perspective through observations added to the study as an 'etic' component, thus providing further insight into the emic view (Higginbottom et al., 2013). In a focused ethnography, the researcher becomes the instrument (Creswell & Creswell, 2018, p. 204; Higginbottom et al., 2013). During the five weeks that the program ran, the PI observed participants in greenspace three to four days a week for six hours a day. Field notes were used to record observations and annotations after each interview concluded and after time spent with participants.

Trustworthiness of Data

Trustworthiness, whereby the findings from this study are considered worth of attention (Nowell et al., 2017), was evaluated by what (Lincoln & Guba, 1985, p.219), defined as credibility, transferability, dependability, and confirmability. To ensure credibility, or internal validity, interviews were audiotaped interviews and transcribed verbatim for data analysis. An audit trail, which represents dependability or reliability, was kept outlining the process and decision-making that guided data analysis. This included a detailed description of initial codes,

subcodes, sub-themes and final themes. The interdisciplinary research team met regularly to review the data, codes, and themes and finalize the results.

Data Analysis

Primary data analysis was done simultaneously with data collection and data preparation. Inductive, latent thematic analysis was used for analyzing data to gain a rich thematic description of the entire data set. Photographs are considered an integral piece of the narrative in photo elicitation, as they add a visual layer. Therefore, images were coded using the same codes used with the narrative data.

The six phases outlined by Braun & Clarke, (2006), guided the data analysis. To address the purpose of this study, two researchers became immersed in the data from transcribed participant interviews related to photographs and their meanings. Data were read and re-read, searching for meanings and patterns. Initial findings were shared and discussed with two other co- investigators to ensure congruence. The PI kept notes on coding, as this audit trail provides a template through which data analysis can be tested for adequacy at a later date (Guba & Lincoln, 1989, p.249; Lincoln & Guba, 1985, p.210). During the second phase, NVivo12 software (QSR International, 2020), was used to visualize codes generated from the data. Codes were shared with co-investigators during several meetings and reorganized based on reflexive writing by the PI and feedback from the research team. Reflexive writing serves as a way to track what emerging data mean and how they are interconnected (Lincoln & Guba, 1985, p. 319). For phase three, potential themes were identified once all the data were coded and categorized. The team worked collaboratively to reorganize and combine codes to develop overarching themes (Braun & Clarke, 2006). During phase four, the team revisited, and revised themes based on data and

determined if the themes captured the purpose of this proposal. Two additional interviews between the research team were conducted to confirm the findings. The PI created a thematic map to illustrate how the data fit together and entered phase five of thematic analysis, further refining each theme, providing names, and giving explicit definitions of each. The final product, or phase six, is a reflection of validity or what inferences are made about the study's findings (Messick, 1989).

Results

The average age of the 11 participants was 15.45 (SD= 1.03) years old (range 14-17). The majority of participants (72.7%) identified as female and 27.2% identified as male. All participants were either starting high school or were in high school. Additional demographic information is provided in Table 1.

During phase two of data analysis, twenty-nine codes were identified. In phase three, codes were further categorized, and four themes emerged. During phase four and five, the PI re-visited, and revised themes based on data and created a thematic map. A further revision in this iterative process resulted in three themes. See Table 2 for the full list of codes, themes, and photographs.

Theme 1: A Tranquil Space in an Unsafe Place.

This theme captures the adolescent perceptions about greenspace. Heavily influenced by family from a young age and, more recently, their own experiences, greenspace is a place where adolescents seek privacy, feel calm and relaxed, and can “separate from everything that's happening.” This theme is supported by adolescent feelings while in greenspace. The majority

described feeling this overwhelming sense of calm while in greenspace, even while picking up litter. One participant stated,

> "I don't know like I like whenever I go out to like pick up trash and like walk by myself like it feels like very calming and stuff."

Others reflected that greenspace became a place to be in and learn about nature, which had a relaxing effect. One participant exclaimed:

> "I felt relaxed when I was outside because I get like I was able to see like, different kinds of animals, different kinds of plants."

Being in greenspace allowed adolescents a moment where they did not have to confront everyday challenges. For example, one participant stated:

> "Therapeutic...Like I think it's going to drown out like real-world problems going on currently. " (Figure 1.).
> Another participant expressed how greenspace was a haven to adjust emotions:

> "I feel like just if I could, anytime like I'd be upset or anything I'd probably come to the park and like, then like that hidden area next to the education building with the trees and just chill out there until I'm fine to go back."

Conversely, greenspace has an aura of danger, whereby safety is a concern and evokes feelings of fear. As such, certain areas of greenspace are avoided; "you don't want to be over there alone or anything" due to poorly lit surroundings, sporadic law enforcement presence and increased nefarious activity (Figure 2.). To illustrate, participants made the following remarks:

> "Really bad history over there. And the street over there is very dangerous. And there's a bunch of drug dealers and gang people or whatever you could say" (Figure 3.).

> "They don't want me walking alone. Yeah, I prefer walking alone. But I had to walk with them because they don't like they don't. They're scared of me walking alone."

> Adolescents suggested, "honestly, just make it safer" by adding more lights and more security patrol by foot; "I think they're [security/ Sheriff] just passing through. I don't really feel they're looking for much. Like they're not they're not on the ground. They're just driving around."

Additionally, time of day influenced adolescents' feelings of why they would not use greenspace. If it was dark or near dark, most participants (n=10) reported that they would not be outside, primarily due to their parents' concerns of safety in conjunction with being outside at dark was not their "thing" reflected by the following statements:

> "Well, around this area it isn't really bad…Before 7:30, I don't really like going outside when it's late out. Then it's not okay. If it's after 8pm, we're not going outside."

> "I would sit there but I'm not like really allowed in dark areas of the park."

Theme 2: Park Means Family Connection with Burgeoning Independence

Childhood memories of being in greenspace elicited descriptions of family cohesion, whereby activity centered around being together for social gatherings, leisurely walks, or structured physical activity. A sense of independence developed through interactions within greenspace as one participant noted:

> "I learned how to ride my bike without training wheels in this park."

This theme is comprised of nostalgia adolescents felt while being in greenspace and the reflections they had on their future.

Seeking greater independence was voiced by all participants; however, they heeded their parents' wishes regarding if and how they used greenspace, articulated in the following statement:

> "Well, in the spring, summertime, okay. I bring my siblings to the park…because I have to."

Overwhelmingly, maternal presence was paramount in decision-making surrounding activities related to using greenspace or being outside at all reflected in the following statements:

> "If my mom doesn't feel like going to the park then we don't go to the park."

> "Before like when I would come to a park with my mom and stuff. I just… it was rushed because she's… just wanted to leave."

While family was still a significant impact on how adolescents used greenspace, adolescents contemplated being more autonomous in using greenspace either alone or with friends, as illustrated here:

> "I'd come here like, even in the field like behind us. Yeah, I would just like sit relaxed, like read a book or something if I was allowed to" (Figure 4.).

> "I can observe it like a lot of parents just like let their kids out. I guess that's weird to me because my mom doesn't let me alone right."

Theme 3: My Park: Sense of Ownership and Responsibility

Adolescents developed a sense of responsibility after being a part of a youth program, which allowed them to take ownership of their community or "my park." Participants in this study described that their greenspace or "my park" needed change to improve safety and promote serenity.

Adolescents became aware of how much work went into maintaining greenspace and how much still needed to be done. One participant said,

> "Because before I did care, I do care about nature, but like not like that, cuz I wasn't really taking care of the park."

Even when tasked with picking up someone else's refuse in humid summer weather, comments still elucidated tranquility:

> "Littering for me like now, because you're here, when you're here you work so hard, and you can see how others when they are here and they want to make a change and you can see how hard they work when they're out here and then like not having that perspective is like not understanding that you wouldn't really care because you're not getting it from this point of view. Like we live it." (Figure 5.).

Participants were cognoscente of passersby watching them clean up trash, weeding and planting new plants and stated that it made them "feel good" and have a "sense of worth." Theme three illustrated just how strongly participants felt about "their park." They had all grown up

using this area of greenspace before they took their first step and felt proud of taking care of it. One participant noted that:

> "Just because somebody else planted them. That doesn't mean I still can't take a picture. Because like I said before, it's still my park and I need to make sure that just because I didn't touch those plants and plant them myself. They're still my plants, you know?" (Figure 6.).

When asked about how a participant felt when they were in greenspace, one described it as akin to being human;

> "The park is like a human being, you have to keep it maintained, need to make sure it's you know, growing the same way you would like to grow."

Participants saw the long-term effects of keeping their community kempt, and one participant had strong convictions of declaring why that was needed:

> "Like if you want to make sure that the greenspace is taken care of well, you need to make sure you're growing with the greenspace and making sure that you're maintaining it, although just because you're saying oh, I like the greenspace- going into greenspace. I want to like you know, help it out or whatever. You also have to, you know, live up to that word. Make sure that you're growing with it and not growing away from it because if you go away from it, you're gonna let the plants die. And then it's not going to be as good anymore."

Discussion

This study focused on the perceptions that adolescents had regarding how and why they used greenspace in an urban area and how they felt when they were in it. The ability to use cameras to take photographs related to the aims of this study, helped promote communication between the adolescent participants and the researcher (Mukumbang & van Wyk, 2020). Autonomy was maintained and there was a greater visual and verbal discourse because participants were able to select which photographs, they wanted to discuss.

Participants experienced feelings of serenity and tranquility after visiting greenspace, which is connected and contributes to positive adolescent emotional regulation or being able to

individually manage emotional responses and mitigate mental illness (Young et al., 2019). Adolescents expressed how greenspace was a place where they could regroup their emotions, which adds to current literature that explores the connection of greenspace and adolescent psychological restoration, or the capacity for natural environments to replenish cognitive resources depleted by everyday activities, thereby reducing stress (Kaplan & Kaplan, 1989; Markevych et al., 2017; Mennis et al., 2018).

While participants recognized greenspace as a relaxing space, many conveyed that greenspace exposure evoked feelings of "being unsafe" and "scared," hindering the majority of adolescents from using certain areas of greenspace regardless of the time of day. Unsafe surroundings are barriers to spending time in greenspace (Sefcik et al., 2019) and identifying such concerns may help target areas that need improvement to lessen nefarious community behavior and increase greenspace use.

Being in greenspace summoned a mixture of fond childhood memories and present awareness that increased independence was becoming a reality. Many shared how they learned to master a developmental milestone, such as "riding a bike without training wheels" or celebrated a special birthday with family and friends. Greenspace provides a venue where cohesion between community, family and friends takes place supports increased autonomy, and mental wellbeing (Jennings & Bamkole, 2019), and may possibly be a strategic intervention to prevent or address mental health illness.

Adolescents became aware that their park, which was part of their community and what they perceived as greenspace, needed nurturing to become the place they affectionately remembered and still used. This awareness may have also led them to participate in the summer workforce program. Being a part of the structured youth program focused on workforce

development in greenspace, instilled environmental responsibility. Environmental responsibility has been intertwined with being connected to greenspace, which influences use and behavior (Jaiswal & Bihari, 2020; Rosa et al., 2019). The youth program may also be a path to positive youth development (PYD). The general concepts that comprise positive youth development include the five C's; competence, confidence, connection, character, and caring (Lerner et al., 2009). Adolescents are more likely to have positive mental wellbeing, as marked by the five Cs of PYD (Geldhof et al., 2015) and after being a part of the youth program, many reflected that they felt "self- worth" or just "worth." Feelings of self- worth are also a part of positive youth development and strengthen the sense of place and community involvement (Bowers et al., 2021). Programs such as these offer opportunities for adolescents to become engaged with their community and develop skills necessary for a successful transition into adulthood. Policymakers should consider youth programs that incorporate the environment as a sustainable way to improve the lives of young people.

This exploratory study offered a glimpse into the adolescent perception of urban greenspace and illustrates areas that require further investigation. The use of youth programs centered in greenspace may be a conduit for PYD. While this study did not assess PYD, it should be included in future research since the connection to nature is closely linked to many PYD outcomes (Bowers et al., 2021). Additionally, the environmental stewardship that was expressed during participants' duration in an urban youth program may have positive long-term effects that endure over a lifetime and should be explored.

Limitations

The recruitment occurred during a summer youth program in an urban area and may be subject to sample bias as this was a convenience sample. Data collection was limited to a five-

week period over the summer months, which limits exploration of how adolescents perceive and use greenspace over time or during other parts of the year, especially when weather is a consideration. This study explored the context of an urban environment in the northeast with adolescents between ages 12-18, and findings may be very different in another setting, such as a rural area or one that has less greenspace or with a different age range. Additionally, we looked specifically at greenspace, and did not include other landscapes such as water, snow, or deserts. Exploring how and why an adolescents use these landscapes and how they feel when they are in them would add to the science of understanding the mechanisms that drive mental wellbeing in various environments.

Nursing implications

The relationship between urban green space use and adolescent mental health is an important factor to consider, especially since many reported that they felt relaxed and calm while in it. The connection of the environment and health is well documented and should be implemented at all levels of prevention. Asking adolescents if they use greenspace should be part of nursing assessment. Adolescents may not have access to or may not realize the benefits that greenspace have on mental wellbeing. As the largest professional group within healthcare, nurses can recommend environment-based interventions, such as utilizing greenspace to promote mental wellbeing. Nurses are active listeners and great communicators, qualities that are well suited to collaborate with members of the community and city/region officials to advocate for safe, accessible greenspace in urban areas.

There is also a greater need for nurses to engage in research that incorporates the built environment as an environmental intervention for health. The complexity of this phenomena

merits collaboration with experts from other disciplines. Interdisciplinary efforts will generate new knowledge that will inform practice and change policy.

Conclusion

Implications from this study suggest that an environmental approach is a potential point of intervention to be explored for mental wellbeing. "Growing with greenspace" and their community positively impacted raising awareness, which could increase salutogenesis and environmental stewardship for generations to come. Adolescent's sense of calm when in greenspace needs further evaluation since this is an important facet of emotional regulation. Nursing and other healthcare providers should consider the built environment as another approach to promoting mental health.

This study supports the use of photoelicitation as an effective method for collecting data in a population that may be reluctant to share their feelings with researchers. The use of autophotography and photo elicitation transcended cultural and linguistic barriers that may be evident using other methodologies. As such, this study generated new knowledge about adolescent perception of greenspace, how and why they used it, and what they felt when they were in it.

While greenspace may be a potential mediator for mental wellbeing, interdisciplinary research is still needed that focuses on this developmental age and for a longer duration of time. There is also a need to explore perception of scary or dangerous greenspaces, so that urban planners, organizations that are vested in greenspace and members of the community can identify and improve, which may minimize barriers of greenspace use.

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Table 1

Demographic characteristics of the sample (N=11)

Characteristics	(n) %
Gender	
Male	(3) 27%
Female	(8) 72%
Preferred not to answer	(0)
Race/Ethnicity	
Non-Hispanic Caucasian*	(1)1%
Non-Hispanic Black	(5)45%
Hispanic	(6)54%
Other	(0)
Preferred not to answer	(0)
*1 participant chose multiple categories	
Age	
14	(2)18%
15	(4)36%
16	(3)27%
17	(2)18%
Grade in School	
12	(2)18%
11	(3)27%
10	(3)27%
9	(3)27%

Table 2

Codes and Themes

Code	Themes/ Description
	Theme 1: A tranquil space in an unsafe place: This theme captures the adolescent perceptions about greenspace. Heavily influenced by family from a young age and, more recently, their own experiences, greenspace is a place where adolescents seek privacy, feel calm, and relaxed. Conversely, greenspace has an aura of danger, whereby safety is a concern and evokes feelings of fear. As such, certain areas of greenspace are avoided due to poorly lit surroundings, sporadic law enforcement presence and increased nefarious activity
Feelings in the park	
Feelings of Calm	
Surroundings	
Wildlife	
Invasive Insect	
Safety	
Lighting	
Time of day	
Time of year	
	Theme 2: Park Means Family Connection with Burgeoning Independence: Childhood memories of being in greenspace elicited descriptions of family cohesion, whereby activity centered around being together for social gatherings or leisurely walks. A sense of independence developed through interactions within greenspace. While family was still a major impact on how adolescents used greenspace, adolescents contemplated being more autonomous to use greenspace either alone or with friends.
Covid	
Equipment in the Park	
family	
Memories	
family	

Influences	
Reflections	
proximity of greenspace park	
Use of Park	
	Theme 3: This is My Park and Now it's My Responsibility: Adolescents developed a sense of responsibility after being a part of youth program, which allowed them to take ownership of their community or "my park." Participants in this study described that their greenspace needed change to improve safety and promote serenity. They became aware of how much work went in to maintaining greenspace and how much still needed to be done and reflected that their own growth includes how they relate to greenspace and how they see themselves using greenspace in the future.
Awareness	
Trash	
Perception about litter	
Youth Program	
Learning	
My Park	
Wrong with the Park	
Change	
Green Space Perception	
	Miscellaneous
Difficulty using camera	
Pictures	

Figures

Figure 1.

Therapeutic

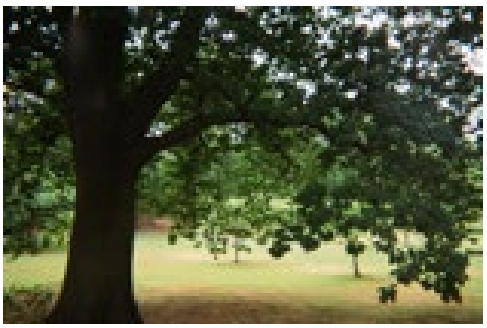
Figure 2.

You don't ever want to be there alone

Figure 3.

Really bad history here

Figure 4.



A place to sit

Figure 5.

Picking up someone else's litter

Figure 6.

My park, my plants no matter who planted them