



Public nature and health for homeless populations: Professionals' perceptions of contingent human benefits and harms

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ABSTRACT

This article investigates relationships between public nature and health for unsheltered homeless populations. It examines perceptions of health benefits and harms for people living in public natural areas including local, state, and national forests and parks in the Seattle metropolitan area (USA). Interviews with environmental, social service, and law enforcement professionals who regularly interact with this vulnerable population were conducted and thematically analyzed to understand perceptions of physical and mental health outcomes. Results show professionals' perspectives on the health benefits and detriments of time spent in natural environments and the contextual factors perceived to influence health. Interviewees' observations about the variability of personal circumstances and biophysical, social, and weather conditions encourage the nuanced consideration of how contingent therapeutic landscapes provide deeply needed benefits, but for a population with a diminished capacity to adapt when conditions change. We conclude with insights for future research that directly assesses homeless populations' exposures and health outcomes of living in public natural areas.

1. Introduction

Beneficial outcomes from exposures to natural environments—such as improved mental health, social connectivity, and lower blood pressure—are influenced by how and where people spend time over their life course, including in residential and recreational settings (Bratman et al., 2019; Frumkin et al., 2017; Hartig, 2021; Lackey et al., 2021). Studies using environmental psychology and epidemiology approaches tend to include populations whose exposures to natural environments are measured in terms of minutes or hours per day or week (e.g., Neill et al., 2019; White et al., 2019), and often use participant samples from wealthier, whiter, Western-World countries (Gallegos-Riofrío et al., 2022). More research is needed to investigate differential effects on populations with different needs, abilities, and vulnerabilities, especially for those whose time spent in nature is less discretionary or diverges from dominant patterns (Bell et al., 2019; Colley et al., 2022; Mitchell et al., 2015).

People experiencing unsheltered homelessness comprise a

population that out of necessity spends much of its time outdoors, and for whom the pathways and specificities of the beneficial effects of natural environments on well-being are largely understudied. Yet, this population's exposures to adverse or unhealthy outdoor living conditions are well known (Anderson et al., 2021; Bezgrebelna et al., 2021; Gibson, 2019; Nicolay et al., 2016; Ramin and Svoboda, 2009). At the end of her book about the history of camping as a functional, political, and recreational act, Young (2021, p. 300) draws attention to this knowledge gap: “If the nature cure were truly universal, then why are those without homes, who camp as regular mode of living, not the healthiest among us? [...] Whether people experiencing homelessness are or are not in need of a nature cure, or if the cure is only a function of leisure, rather than necessity or labor, is a question that largely goes unasked.”

In this article, we present exploratory research that helps researchers and practitioners understand relationships between public nature and health for unsheltered homeless populations. We explore context-specific questions about “for whom” and “under what conditions”

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nature contributes to human health benefits and harms. To do this, we conducted interviews with a sample of professionals who interact regularly with people living in public natural areas across an urban-to-wildland system. Interviewees were predominantly from the environmental sector, with a smaller number of social service and law enforcement professionals. Our analysis examines (1) the basis for observations professionals offered, related to different ways of knowing; (2) how professionals perceived relationships between the health of people experiencing unsheltered homelessness and their outdoor living conditions; and (3) the contexts that professionals saw as most salient to those relationships, in terms of the interplay between beneficial and detrimental exposures. Insights help inform future research designs that include the first-hand perspectives of people experiencing homelessness and other primary data that help directly assess their exposures and outcomes.

2. Background

2.1. Nature and health

The negative health effects of outdoor environments are well documented and result from exposures to extreme temperatures, pathogens, natural disasters, air pollution, and other factors, and include increased risks of cardiopulmonary diseases, cognitive decline, malnutrition, and other detriments (Bezgrebelna et al., 2021; Prüss-Ustün et al., 2016). Pathways linking the negative effects of natural and outdoor environments on health are relatively well understood and direct, and include what Marselle et al. (2021) describe as the “causing harm” domain of pathways, including injury and infectious agents.

The positive health effects of factors such as residential greenness, and the presence of trees, water, parks, and natural soundscapes have also been increasingly documented, and include associations with reduced obesity, stress, blood pressure, and other restorative and protective factors (Bratman et al., 2012; Frumkin et al., 2017; Hartig et al., 2014; Kaplan, 1995; Remme et al., 2021; Stier-Jarmer et al., 2021; Ulrich et al., 1991). These effects may be due to memories, lived experiences, and positive associations with natural environments, as well as psycho-evolutionary pathways (Bratman et al., 2021). As an example of the latter, the biophilia hypothesis emphasizes the evolutionary basis of human needs for, behaviors in, and responses to nature (Wilson, 1984).

Posited pathways responsible for the benefits of nature contact include stress reduction theory (SRT; Ulrich et al., 1991), attention restoration theory (ART; Kaplan and Kaplan, 1989); impacts on the immune system (Kuo, 2015; Li, 2010); increased physical activity (Remme et al., 2021) and social cohesion/restoration (Hartig, 2021; van den Berg et al., 2019); among others. SRT and ART are often framed as individual-level mechanisms that help explain the various types of affective or cognitive effects that result from contact with restorative environments, and the ways these environments help individuals experience a replenishment from the affective and cognitive demands of urban environments.

Recent work by Hartig (2021) focuses on the ways mechanisms act on social relationships, and not just the individual level. Hartig develops relational restoration theory and collective restoration theory (RRT; CRT), which collectively refer to “social restoration processes” (Pasanen et al., 2023). RRT explains how natural environments provide the context for small groups of individuals to restore strained relationships, as they exchange and provide support, trust, empathy, and care for each other in the face of shared goals to meet environmental demands. This restoration can also take place on an individual level, resulting in replenished resources for fostering and engaging in healthy social relationships after a nature experience. CRT relates to the ways this restoration between smaller groups can spread to the larger community in positive ways, and to the role that institutions play in providing access, space, and time in natural environments for populations to replenish their depleted resources.

Research has focused on the minimum dosage of nature exposure needed to sustain health benefits, and some evidence suggests thresholds after which little or no additional marginal benefit is gained (e.g., White et al. (2019) found a threshold of well-being associations from nature contact to occur at or above 120 min/week, and that these associations peaked at 200–300 min/week, after which there were no additional benefits). There has been less research focused on the outcomes related to less dominant forms of nature interactions (Bell et al., 2019), including those that might involve long-term camping activities, such as among groups who spend extensive outdoors (e.g., hunter-gather societies, outdoor expeditionists)—typically populations that are properly skilled and equipped for long periods of time under variable outdoor conditions.

Environmental exposures—both detrimental and beneficial—do not occur in isolation, and patterns across society demonstrate the social and environmental determinants of health. Disproportionate burdens of environmental ills are typically borne by communities with marginalized racial and ethnic identities and lower socioeconomic status (Cole et al., 2021; Wolch et al., 2014). Disproportionate benefits of environmental goods are borne by privileged communities with greater social, political, and financial resources (Cole et al., 2021; Rigolon et al., 2021; Rigolon and Németh, 2021). The environmental justice implications of these cumulative exposures (both benefits and burdens) are still in the early stages of being more comprehensively understood.

2.2. Homelessness and health

In the United States, homelessness remains an enduring challenge for communities, families, and individuals, despite significant public and private investments (Fowler et al., 2019). In 2023, estimates showed that 653,100 people were experiencing homelessness during the national one-night count (US HUD, 2023), a method generally considered to produce an underestimate (Roncarati et al., 2021). Research has shown that rates of homelessness across the United States are highly related to housing availability and costs, and correspondingly are highest in cities such as Los Angeles, San Francisco, Seattle, Washington, D.C., Boston, and New York (Colburn and Aldern, 2023). The homeless population is diverse in terms of age and race/ethnicity, including unaccompanied youth, families with and without children, and an overrepresentation of people who identify as Black or Indigenous (US HUD, 2023). It includes people living in emergency shelters, transitional housing, vehicles, parks, and other outdoor locations (US HUD, 2023).

Health disparities for homeless populations as compared to housed populations include a shorter life expectancy, higher prevalence of mental disorders, increased risk of acute and chronic illnesses, increased risks of injury, increased dependence on drugs, and increased incidence of trauma (Gutwinski et al., 2021; Schanzer et al., 2007; Stafford and Wood, 2017). These disparities are related to a lack of access to routine healthcare, unstable or unsanitary living conditions, and poor control of manageable conditions (Flanigan and Welsh, 2020; Gutwinski et al., 2021; Schanzer et al., 2007; Stafford and Wood, 2017). Military veterans have additional vulnerabilities among the homeless population related to their distinct patterns of disabilities, injuries, and trauma (Nicolay et al., 2016).

2.3. Homelessness, nature, and health

Compared to the overall homeless population, people experiencing “unsheltered” homelessness—meaning those who reside in parks, vehicles, and other public spaces—are more likely to be chronically homeless (US HUD, 2021). A recent review found that overall, people experiencing unsheltered homelessness are in worse health than people experiencing sheltered homelessness (Richards and Kuhn, 2023). Unsheltered homeless populations have poorer access to sanitation and hygiene resources (Flanigan and Welsh, 2020) and are especially vulnerable to environmental exposures (Goodling, 2020). Many

exposures (e.g., air pollution, extreme temperatures) are being exacerbated by climate change, and compounded by social factors (e.g., isolation) and health factors (e.g., chronic diseases and disabilities), resulting in reduced adaptive capacity for unsheltered populations to respond to natural disasters, extreme weather events, and other stressors and disruptions (Anderson et al., 2021; Bezgrebelna et al., 2021; Gibson, 2019; Hardenbrook et al., 2022; Nicolay et al., 2016; Ramin and Svoboda, 2009). Outcomes such as increased mortality from extreme heat events, vector-borne diseases, and air pollution are related to a disconnection from systems of communication and healthcare (Bezgrebelna et al., 2021; Flanigan and Welsh, 2020; Ramin and Svoboda, 2009).

Some scholars have found that outdoor, natural environments also offer benefits to people experiencing homelessness (Koprowska et al., 2020; Mokos, 2017; Palta et al., 2016; Rose and Johnson, 2017; Stolte and Hodgetts, 2015). Studies exploring the beneficial connections between the broad, complex constructs of nature, health, and homelessness have mostly been on small scales, and not set up to test causation. Benefits observed include the use of public natural areas to rest and enjoy nature (Koprowska et al., 2020); to exercise autonomy and self-sufficiency (Rose and Johnson, 2017); to avoid violence (Mokos, 2017); and to receive ecosystem services such as water for drinking, bathing, and cooling (Flanigan and Welsh, 2020; Palta et al., 2016). Studies have found that people who are unsheltered seek to improve their health—often in cooperation with others—by introducing routines, familiarizing themselves with settings, and altering physical and social conditions (de Certeau, 2011; Stolte and Hodgetts, 2015; Wolch et al., 1993). Many such practices have strong connections to therapeutic landscapes but have not been systematically studied on larger scales.

Therapeutic landscapes have been conceptualized by health geographers and landscape architects to describe diverse settings (ranging from public natural areas to hospitals) conducive to healing through their physical, social, and symbolic qualities (Bell et al., 2018; Gesler, 1993, 2003; Marcus and Sachs, 2014). Experiences of therapeutic landscapes are mediated by biophysical and social features and people’s personal experiences and characteristics (Bell et al., 2014; Conradson, 2005; Foley and Kistemann, 2015; Milligan and Bingley, 2007). This contextual nature of therapeutic landscapes raises important questions for people who are unsheltered, who lack consistent access to private, domestic, indoor spaces and often occupy marginal, outdoor, public spaces not intended for human habitation (Hodgetts et al., 2011; Mokos, 2017; Stolte and Hodgetts, 2015). Divergent experiences of (un)therapeutic landscapes can produce outcomes that are harmful or stress-inducing for vulnerable populations, rather than healing or restorative (DeVerteuil and Evans, 2009; Pitt, 2018).

Environmental justice scholarship is increasingly attentive to people experiencing homelessness (Bonds and Martin, 2016; Goodling, 2020; Rose, 2019). Injustices can take many forms, including how “undesirable” uses of public natural areas become stigmatized and the development of parks and other nature-based amenities cause people who are unsheltered to be policed and/or excluded from spaces previously accessible to them (Anguelovski et al., 2021; Bonds and Martin, 2016; Cole et al., 2021; Dooling, 2009; Goodling, 2020; Klein and Riemer, 2011; Koprowska et al., 2020). These patterns raise concerns about the health effects for people being driven into increasingly inhospitable or untherapeutic environments by deliberate or inadvertent “environmental” actions (Derrien et al., 2023; Dooling, 2009; Goodling, 2020).

While time spent in natural environments is only one factor among many that may influence the health of people experiencing homelessness (with other factors including substance abuse, access to healthcare, availability of temporary or permanent housing, ability to earn a livable wage, presence of social support system, etc.), we know that this factor has wide ranging, interconnected influences on people’s physical, and mental health in many other contexts (Frumkin et al., 2017; Hartig et al., 2014). Because of the limited knowledge in the realm of nature and health for homeless populations, this article takes an initial step toward

the more comprehensive study of this topic.

3. Methods

3.1. Study area

Our study focused on King and Snohomish counties in the Seattle metropolitan area in Washington (USA). Seattle—Washington’s largest city—sits at the intersection of major east-west and north-south interstate highways. Seattle, Everett, and other urban centers near Puget Sound have year-round temperate climates with a rainy winter season. Urban centers are connected to the Cascade Range via a patchwork of landownerships that include extensive swaths of public lands. Across a relatively compact urban-to-wildland system, many national, state, and local forests and parks in the study area are accessible for camping in developed sites and sanctioned and unsanctioned undeveloped sites.

For decades, homelessness has challenged King and Snohomish county residents (both unhoused and housed), city officials, and social service, land management, and law enforcement agencies (Dooling, 2009; Herring, 2014). Both counties have recently experienced rapid population and cost-of-living increases, along with an increasing deficit of affordable housing (Colburn and Aldern, 2023; PSRC, 2022). In 2020 (when our data collection began), Washington was the US state with the fifth highest rate of homelessness, with an estimated homeless population of 22,923 (Table 1) (US HUD, 2021; 2022b). Almost half of Washington’s homeless population was estimated to be unsheltered—meaning almost 11,000 people resided in areas not intended for human habitation (US HUD, 2021; 2022b). More than half of Washington’s homeless population lived in King County (11,751 people, 47% unsheltered), and another 1132 people (59% unsheltered) lived in Snohomish County (US HUD, 2022a). The chronically homeless population is disproportionately unsheltered (Table 1).

3.2. Data collection and sample

The first phase in a complex qualitative research design is to conduct interviews with accessible informants (Kristensen and Ravn, 2015), so our data collection was geared toward understanding multiple types of professional perspectives, and how they gained and shared knowledge. We interviewed professionals by phone or video who worked in our study area and interacted with unsheltered populations, either in social service capacities or who patrolled, stewarded, or managed public natural areas used by them. We sought out people who worked in diverse roles and at many levels of government and nongovernmental organizations (national, state, local). We used a chain referral approach until our sample subpopulations were saturated (Morgan, 2008), or in the case of one subpopulation, we exhausted leads for potential interviewees (see 5.3).

Our semi-structured interview guide included 20 questions, adapted to match interviewees’ professional roles. Related to the interests of this article, interview questions asked interviewees to describe the perceived benefits and detriments they had observed for unsheltered homeless populations, and health-related dynamics they had observed in uses of

Table 1
Characteristics of the overall homeless and unsheltered homeless population in Washington (statewide), and King and Snohomish counties (US Census, 2020; US HUD, 2022a; 2022b).

Area	Overall population	Homeless population (% unsheltered)	Chronically homeless population (% unsheltered)
Washington (statewide)	7,705,281	22,923 (47.2%)	6756 (66.2%)
King County	2,269,675	11,751 (47.5%)	3355 (58.9%)
Snohomish County	827,957	1132 (59.5%)	532 (77.1%)

public natural areas. While most questions were framed around populations or groups, we also asked for examples at the individual or site level. The University of Washington Human Subjects Division reviewed this project and determined that the activity qualified for exempt status.

Between September 2020 and March 2021, five research team members conducted, audio-recorded, and transcribed 42 interviews with 46 interviewees. About 60% of the potential interviewees contacted agreed to participate. Two interviews were conducted with more than one person, at the interviewee's request. We categorized the sample into four subpopulations by their primary professional roles: land manager interviewees ($n = 17$; e.g., park ranger), environmental steward interviewees ($n = 15$; e.g., restoration ecologist), social service providers ($n = 7$; e.g., housing services director), and law enforcement officers ($n = 7$; e.g., police sergeant). Interviews averaged 55 min and resulted in a dataset of 580 single-spaced transcribed pages. We refer to interview excerpts in the results with abbreviations for professional roles (i.e., LM, ES, SS, LEO) and interview number (e.g., "LEO-1").

3.3. Analysis

We conducted a qualitative, thematic analysis, using NVivo (release 1.5) to code interview transcripts (Braun and Clarke, 2006). Three rounds of intercoder reliability testing helped us refine definitions, add emergent codes, and ensure consistent coding styles, resulting in a final codebook defining 11 unique codes. In this article we report on study findings related to a subset of our two health-related codes. Two research team members coded the full set of interviews, applying codes at the sentence or multiple-sentence level. We used NVivo to export reports of coding prevalence, distribution, and overlap. While thematically summarizing coded material, we were attentive to the basis interviewees reported for their knowledge (e.g., first-hand observations, personal experiences, anecdotes shared with them as second- or third-hand retellings); we note these when presenting our findings because they offer insight on interviewees' professional bases for knowledge and the type of knowledge their insights represent. These epistemological issues are explored in the results section (4.1) and discussion section (5.3).

We ensured high qualitative standards through attention to several aspects of trustworthiness. Our detailed documentation encouraged reflection and consistency and ensured our approaches could be adapted to other contexts (Lincoln and Guba, 1985; Rose and Johnson, 2020). We examined our positionality and biases throughout our process, discussing how they influenced our research instruments and interpretations (Rose and Johnson, 2020). This iterative process led to strong agreement and confidence in our results.

4. Results

The results are organized into the following four sections: the first section summarizes what interviewees presented as the basis for and value of their knowledge; the second two sections present the detriments and benefits (respectively) that interviewees perceived related to outdoor living conditions and health; and the fourth section presents the contingent nature of health benefits and harms observed.

4.1. Ways of knowing and the value of secondary perspectives

The perspectives interviewees shared ranged from recounted anecdotes they had been told by people experiencing homelessness, direct observations, inferences made based on their personal experiences, and scientific research on the health outcomes of different types of engagements with nature and natural environments. In answering interview questions, most interviewees readily and repeatedly acknowledged the nature of their knowledge, the limitations of their knowledge, and the biases they introduced. Some interviewees felt uncomfortable speculating about the experiences of others and suggested the need to directly

study the experiences of people who are unsheltered to be able to answer such questions. However, these interviewees also expressed caution about the difficulty of maintaining contact with people who lived transient lives and the limitations of relying exclusively on self-reports.

Interviewees' perspectives on the value of their observations as professionals provided insights on how such secondary perspectives could be used to complement first-person accounts. For example, one social service provider explained that even if people experiencing homelessness themselves did not articulate it in the stories they recounted, the effects of different outdoor environments on them were observable to others. The interviewee explained,

"I don't think folks really have the capacity to articulate this. I think that we're seeing the difference between someone coming from sleeping in the woods versus having to spend the night on the sidewalk because they need to wait for an appointment the very next morning. [...] There was a difference in the way that they were. Sort of, their presence. The way that they talked to me was just—they were honestly calmer. [...] I don't think you have the capacity to think about how nature is benefiting you. You know, it just is. I can tell from just my observations." [SS-1]

Another way interviewees intuited the effects of nature was by observing people's relationships with the outdoors and natural environments after they became (re)housed. Such observations suggest the important role social service providers and others who regularly interact with homeless populations can play in triangulating observations to understand the outcomes of time spent in different living environments. For example, a social service provider described interacting with people who struggled to adapt to indoor living, describing the transition period of *"still living homeless with a roof"* and providers seeking substitutes for the nature that had previously served important roles in their clients' lives. They described,

"Even when we house people who have been chronically homeless, they tend to leave their windows open. They're used to the noise. They're used to the fresh air. They're used to being cold. [...] I've even had people bring dirt into their apartment. [...] It's sort of like, do you need a plant? Let's get to a plant so you can smell the earth and you can smell the floral and things like that. [...] They're used to that aroma." [SS-7]

Overall, interviewees prefaced their observations with caveats that their perspectives only shared one part of the story—the part that were observable to professionals who interacted with people experiencing homelessness in their regular work lives. Many emphasized the importance of future research pairing such observations with this population's self-reported experiences (see 5.3).

4.2. Perceived detriments of outdoor living conditions and health

Professionals' perceptions of the detrimental effects of environmental conditions relied heavily on their direct observations of, and interactions with, people who were unsheltered. Overall, the perceived health-reducing or harmful factors in public natural areas were environmental exposures such as extreme temperatures and storm events; a lack of opportunity for good hygiene and sanitation practices related to the disposal of human waste and trash; limited access to the goods and services needed to maintain good health; and social vulnerability resulting from isolation, violence, theft, stigma, and displacement, and a lack of authorities present for protection. We found that the perceptions of the detrimental effects of public natural areas on people experiencing homelessness were generally consistent among interviewees in different professional roles.

Environmental conditions were sometimes seen as creating a generative cycle of worsening physical and mental health. For example, a social service provider listed some of the health detriments of living in public natural areas: *"Sanitation. Food. Warmth. Protection. The elements. Safety. I think folks have to be pretty hyper-vigilant, which is stressful, which puts more stress on any mental health issues you have"* [SS-5]. Many

interviewees focused on challenges with climate and weather, including typical seasonal variations in temperature and precipitation, as well as less predictable storm events. Some of these challenges were seen as exacerbated by a lack of adaptive capacity and the push of people to marginal and potentially dangerous areas, including in public natural areas next to flood-prone rivers. Law enforcement officers commonly encountered homeless campers in public safety and emergency situations, such as one law enforcement officer who described challenges he saw for people camping in riparian areas: *"We have increase in river volumes here; we've actually had circumstances where we've had to rescue homeless individuals that are basically stuck on high ground in our city parks. So, it becomes a public safety issue"* [LEO-1]. Others mentioned concerns with storms, landslides, and wildfire and smoke risks. Another law enforcement officer explained how they had to,

"... go with search and rescue, and rescue folks that were camping when we've gotten feet of snow, just days upon days of snow coming down and it ends up piling up and then they're stranded and they can't get out. And we've also had in the areas with trees coming down blocking roads, trees coming down in their campsites. You know we don't get a whole lot of regular campers when we have windstorms and really nasty weather, but those folks are up there 24 hours, 24/7." [LEO-3]

Interviewees also focused on what they perceived as sanitation and hygiene challenges. Persistently wet conditions were often mentioned as leading to moldy sleeping bags and tents. While some noted the advantages of having space to bury waste and access to rivers and other waterbodies for washing and bathing, most noted that the physical spaces at the sites they had observed were inadequate to support the concentration of use they received. One environmental steward said, *"I worry about the folks drinking water from the creeks that they're living along; they really don't have good water quality, and that sort of thing. And having an adequate place for hygiene, which I've also seen become a problem"* [ES-1]. In some areas, interviewees noted that homeless campers seemed to reduce hygiene and sanitation problems by using public recreational facilities (e.g., restrooms, water fountains).

Social service providers offered detailed perspectives on the type of health conditions and vulnerabilities they encountered among this population, which were often linked to a lack of access to care for substance abuse and mental illness. One social service provider explained, *"Whereas folks who are in the woods—unless they're in a camp with other folks in the woods—they tend to be isolated. [...] The chances of you getting connected to resources are probably going to be lower if you're by yourself"* [SS-1]. Delays in emergency responses because of isolation and a lack of communication methods in more remote public natural areas was especially concerning for victims of domestic violence. A perceived lack of access to goods and services created nutritional vulnerabilities, as one environmental steward elaborated:

"How do you get food, water, other material, sustenance needs to where the living arrangement is? You don't have a water tap, you don't have these other, sort-of ready-made things that you can easily have someone grab off for you or go get yourself or take transit to deliver. There's often a walk in or a hike in, and so it's not as easy as having the ready access that you might have in a shelter situation or tiny house village." [ES-12]

The uncertainty and stressors of day-to-day life was mentioned by many interviewees, not just related to weather conditions and access to services, but also the social vulnerability created by stigmatization by the general (housed) population, and enforcement practices that might force them to move. One land manager described that *"They're continually being pushed around. So, that's a challenge, to always be hidden or obscure"* [LM-6]. This instability was described as an ever-present stressor that took its toll on people's mental health; public natural areas that offered more opportunities to be hidden were perceived as most desirable.

4.3. Perceived benefits of outdoor living conditions and health

We found that many professionals observed, inferred, or had anecdotal insights concerning a range of benefits from public natural areas for unsheltered homeless populations. Overall, these were related to a biological affinity for nature, its role in stress reduction, the creation of privacy, the provision of space and opportunities for desired social conditions, and the materials needed for daily activities. We found that the perceptions of the beneficial forces of public natural areas on people experiencing homelessness were generally consistent among interviewees in different professional roles.

Many interviewees indicated a popular familiarity with scientific theories related to nature and health but did not name them explicitly. For example, the idea of a deep seated, human affinity for nature was often raised, but the biophilia hypothesis was seldom named. A typical commentary was offered by an environmental steward, who said, *"We're all human beings and I know people like being outside and being in nature. So I imagine the reason we are all drawn to beautiful natural areas is the same reason homeless folks are drawn to these areas as well"* [ES-1].

Some interviewees drew on their own personal experiences with recreational camping and nature to speculate about what they would do if they experienced homelessness, affirming the decision to camp. At times, this knowledge was grounded in first-hand observations that had been shared with them by people experiencing homelessness. For example, a land manager offered an anecdote of someone who had presented him with their logic, describing,

"We have some individuals who, they really just like being in the woods. I had one say, 'if you're homeless, would you rather be homeless in a city or homeless in the forest?' I was like, 'okay, yeah, I guess in the forest.' It's pretty. It's quiet. It's secluded. Yeah, that's why I think they pick a lot of our parks." [LM-16]

Most interviewees emphasized the undesirable characteristics in shelters that led people to choose to camp in the first place, even when other options were (conditionally) available. A law enforcement officer shared that when they had started an outreach program, they thought that *"... two out of three or three out of four people that you offered services and housing would immediately [be] like, 'I'll take it.' And that was not the case. Most of those people were doing what they're doing by choice"* [LEO-4]. A social service provider elaborated on the aversion to shelter options for military veterans; offering that for those with posttraumatic stress *"... in larger groups, you don't really sleep well. If you're [... a] military sexual trauma victim, large groups don't work"* [SS-2]. Others emphasized that public natural areas offered people with pets and families the opportunity to live together in the same space, and the high therapeutic value they saw for maintaining those connections. Some interviewees suggested that the familiarity of camping (or camping sites) could feel like a less stigmatized option for some than using a shelter.

A major type of benefit emphasized by interviewees were the social environments public natural areas enabled, such as the opportunity to escape restrictive rules and structures, and gain independence and self-determination to have the social interactions they chose. A land manager explained, *"It's something that they could essentially call their own when they don't have a place to call their own. And I think that that's an important part of having a home, is having a place of solace and refuge"* [LM-9]. The desire for independence was often seen as related to the avoidance of drugs or being able to use them without public scrutiny. For example, a law enforcement officer recounted,

"A lot of people I come in contact with [...] are] actively trying to work on getting clean. And coming out to the national forest is a way of them saying 'I'm going to be done with this.' [...] That is their way to escape and try to leave that behind." [LEO-5]

Many interviewees drew on their knowledge of research on the immunological and psychophysiological effects of natural environments

on people, such as impacts on objective correlates of stress. These were mostly based on findings for the general (housed) population, but interviewees inferred benefits for the unsheltered homeless population as well. For example, a social service provider explained,

“There’s a clear benefit for staying in the outdoor spaces, in the public spaces. You know, the same benefits that maybe you and I would experience, just being out in that area under the canopy of trees and all of sudden our heart rates drop a little bit, and our blood pressure lowers a little bit. And so, there is some peace there.” [SS-4]

Similarly, an environmental steward cited scientific research to explain why they thought the benefits of nature were especially important for the homeless population, describing,

“Research has shown that, at least under controlled situations, folks with existing conditions, whether that’s existing medical conditions, existing traumas, receive outsized benefits from experiences with natural areas. I would kind of infer that those benefits [...] are] experienced by folks who are experiencing homelessness who, my understanding is, are much more likely to have medical challenges and/or existing and past traumas.” [ES-3]

Privacy, safety, quiet, and nighttime darkness offered by some public natural areas were seen by interviewees as important benefits. Interviewees observed how people experiencing homelessness were able to modify natural environments to create shelters that offered visual privacy and protection. Interviewees offered examples of benefits people had reported to them, some of which interviewees perceived as consciously sought (such as decisions around safety and bodily needs). Interviewees perceived other benefits as subconsciously received (such as the calming effects of natural environments). Some wondered if consciousness of the benefits of time spent in natural environments mattered. One land manager explained, *“I don’t know if they’re intentionally going out there to seek that, or if it’s almost like a subconscious thing and then they kind of realize once they’re out there”* [LM-13]. A social service provider elaborated that,

“There are a lot less triggers in wild areas [...] There’s a sense of safety. I think that’s the conscious part of it. I think the subconscious part of it is, nature really does help regulate our nervous system. Whether we are conscious of it or not, I would imagine that for any of these folks saying, ‘I feel more at ease’ or ‘I worry less. There’s not as much stuff swirling in my brain. I can breathe. I can sleep.’ These are some of the few things that folks have told me.” [SS-1]

Finally, interviewees perceived that the provision of material resources in public natural areas served important health needs, such as water for drinking and bathing. One land manager described, *“There’s a lot of streams in places. You can go days without food, but you can’t go very long without water”* [LM-1]. A few interviewees mentioned an awareness of the use of nutritional resources such as fish and berries. Others described the use of wood on site for campfires for staying warm and cooking, as well as trees for creating a shield from the elements.

4.4. Contingency of health benefits and harms

While interviewees observed positive and negative effects of public natural area use for people experiencing homelessness, many considered the contexts and conditions that were most consequential, offering caveats and cautions. Though unsure of the net benefits and harms, most interviewees concluded that it was likely a combination of both that needed to be considered. One social service provider shared, *“I imagine there’s a bit of a two-sides-of-the coin benefit and harm being out in the natural elements”* [SS-7]. Some wondered if benefits were mediated or diminished by other hazards or risk factors. One environmental steward went as far as to say that it was “disingenuous” to consider any health benefits related to nature for the unsheltered homeless population, because of all the adversity they faced in their living conditions. But

more typically, interviewees considered the cumulative forces that were concurrently experienced. For example, an environmental steward described that, *“It might be a diminished psychological benefit if you are always outside verses being inside and then going outside like us housed people get to do”* [ES-5].

A social service provider offered a different way of considering the interplay of benefits and harms, explaining that they thought that people experiencing homelessness were using nature as a harm reduction strategy, and that their time in public natural areas helped to counteract some of the negative factors they experienced. They described,

“I think that a lot of people who are houseless are really good at harm reduction. The situation that they’re in is really real to them; they’re not disillusioned by it. [...] They know how to minimize the negative effects that they’re experiencing. I think that makes complete sense and I think nature provides a lot of opportunities for that.” [SS-1]

Some interviewees questioned whether true independence and fewer societal constraints could be achieved for this population in public natural areas. While undesirable settings (i.e., shelters) and some laws and rules could be avoided for some time, one social service provider mentioned they thought it was only a “false sense of independence” [SS-7]. Overall, interviewees emphasized that considerations of the benefits and harms needed to be contextual, both to the person or subpopulation of interest, and the environmental conditions present, both of which were imminently variable.

5. Discussion

Our study found that professionals observed distinct physical and mental benefits and detriments for homeless populations living in public natural areas, and that these were often described by their highly contingent nature, related to seasonal environmental conditions and personal circumstances. This offers important insights for how we understand the role of therapeutic landscapes for unsheltered homeless populations, the theories and frameworks that seek to explain how and why benefits and harms are experienced, and how future studies are designed.

5.1. Variably therapeutic landscapes and climate change

Our findings complicate typical conceptions of therapeutic landscapes, in which researchers have largely focused on the positive effects of time in natural environments with specific qualities (Marcus and Sachs, 2014). While professionals in our study did perceive public natural areas being experienced as therapeutic landscapes by homelessness populations, they also contextualized those landscapes as having variable, seasonal conditions that could be decidedly untherapeutic. For example, interviewees’ perspectives shared in 4.4 explain how the same site, area, or landscape can alternate between being therapeutic or untherapeutic, depending on weather conditions, a person’s mental or physical health, and the social context in which they find themselves. This finding is consistent with what others have observed about the use of public spaces for people experiencing homelessness (DeVerteuil and Evans, 2009; Hodgetts et al., 2011; Mokos, 2017; Stolte and Hodgetts, 2015), and encourages future research to consider concurrent or alternating qualities of landscapes as both therapeutic and untherapeutic.

Importantly, our interviewees observed that landscapes that are at times therapeutic can change rapidly, and vulnerabilities related to a low adaptive capacity are especially acute. While climate change was not directly mentioned by many interviewees, many did describe extreme events such as flooding, fire, and heat, and how they displace people from places they have chosen to camp, resulting in lost possessions, and at times causing direct injury or harm. These outcomes make visible the environmental justice implications of climate change, which likely will exacerbate preexisting inequities, and could reduce already-diminished adaptive capacity (Bezgrebelna et al., 2021; Gibson, 2019;

Goodling, 2020). Potential interventions include proactive responses to reduce homeless camping during periods of elevated risk. For those whom proactive measures do not reach, coordinated emergency responses will continue to be needed. For both to be effective, more detailed knowledge of where and when unsheltered populations inhabit different natural areas is needed.

5.2. Pathways

Several of the theorized pathways that connect nature interactions with human health outcomes provide relevant context for our study's findings. Table 2 summarizes our findings from 4.2 to 4.3., and relates them to relevant pathways, theories, frameworks, and mechanisms of action.

Interviewees' observations about the uses of natural areas as places of refuge from city life that pose threats or otherwise deplete affective and cognitive resources are consistent with prospect-refuge theory (Appleton, 1984)—and the resultant replenishment of these capacities in nature are supported by SRT and ART. Theoretical connections to emotion regulation are consistent with research on favorite places that help individuals down-regulate aversive emotions, or reframe current life problems and obstacles and adaptively up-regulate positive emotions (Bratman et al., 2021; Korpela et al., 2001, 2018, 2020). The individual-level benefits that public natural areas provide for sustenance, shelter, and other life-support functions are related to ecosystem services and “nature's contributions to people,” which emphasize the diverse ways nature affects the qualities of human life (Pascual et al.,

2017). The role of nature in enabling independence and self-determination has parallels to these capacities in other contexts (Barrable and Arvanitis, 2019).

Moving up to the level of interactions between individuals and small social groups, our results are consistent with prior studies on relationship and community satisfaction that come from visits to greenspace (Pasanen et al., 2023). Our findings here and in associated work (Derrien et al., 2023) support recent theoretical developments by Hartig (2021) that describe the ways natural environments can help restore and support social resources. This can occur through interactions people have with each other (as well as the environment) in natural areas, specifically those that replenish and support interpersonal relationships. Interactions between acquaintances may evolve in different ways depending upon where they occur. Compared to an urban setting, for example, through the simultaneous replenishment of cognitive and affective functioning that a forest provides, an interpersonal interaction may be more likely develop in positive and adaptive ways, strengthening and restoring interpersonal relationships.

Our findings about perceived health-reducing factors in public natural areas are also consistent with the literature. Though focused specifically on biodiversity, Marselle et al.'s (2021) framework provides structure for considering the environmental pathways that cause harm to people; in our study's findings, these were related to perceptions of increased environmental hazards and related risks that came from spending above-average time outside with decreased opportunity for good sanitation and hygiene practices. Understandings of social vulnerability are related to reduced access to needed resources or services (Lundgren and Jonsson, 2012), and in our study's findings, these included decreased proximity to, and communication about, social and material resources and services. This was seen as resulting in social isolation, nutritional deficiencies, untreated health conditions, and the resulting lack of adaptive capacity to respond to changing weather conditions, natural disasters, and other hazards. These findings are consistent with Hardenbrook et al.'s (2022, p. 1163) observation that, “... homelessness, broadly, and unsheltered homelessness, more specifically, act similarly to “pre-existing conditions” or “co-morbidities” in medical discourses [...], where a fundamental condition of life complicates and is exacerbated by nearly every other personal and social condition.”

5.3. Limitations and future research

Despite our recruitment efforts, our dataset was skewed toward environmental perspectives, with fewer interviewees working in social service or public health roles. Such contacts were understandably harder to reach during our data collection period during the COVID-19 pandemic. It may also reflect who is interacting most with people living in public natural areas—for example, Flanigan and Welsh (2020) found that people experiencing homelessness near California waterways were more likely to have recently interacted with an environmental organization (48%) than either a social service organization (29%) or the police (40%). Our findings, though, do suggest the importance of engaging more extensively with social service providers who could share regular observations of clients during and after periods of homelessness. Those working in the environmental sector may also exhibit professional or personal biases in interpreting nature-based activities as positive or beneficial; we note, however, that in our study these perspectives were shared across our sample's subpopulations.

Future research phases that directly engage people who have past and present lived experiences of homelessness will also be foundational to our understanding by incorporating other important “ways of knowing.” This will allow the further triangulation of perspectives and data sources that help reduce the biases from second-hand perspectives by those with more privileged places in society (Serrant-Green, 2011). This bias is an inherent limitation of the first phase of our research design that is presented here.

Table 2

Summary of study findings and their connections to pathways and mechanisms of action that explain why/how interactions with nature contribute to human health outcomes for homeless populations living in public natural areas.

Study findings about perceived health-promoting factors	Potential pathway or mechanisms of action
Uplifts through human affinity for nature and natural beauty	Biophilia
Allows for privacy and cover created by topography and vegetation	Prospect-refuge theory
Reduces stress through calm and quiet environments	SRT
Restores cognitive function and attention capacity by reducing the noise, distractions, and negative social demands of urban environments	ART
Provides affordances for emotion regulation via places selected for solace and privacy	Emotion regulation and self-regulation theories
Provides for psychological, material, and nutritional needs	Provisioning and psychological ecosystem services/nature's contributions to people Self-determination theory
Allows for experiences of independence away from social constraints	
Encourages peer support and restores interpersonal relationships away from undesirable social structures or influences	RRT, CRT
Study findings about perceived health-reducing factors	
Increases exposure to environmental hazards because of increased time spent outside	“causing harm” domain of pathways (e.g., pollutants)
Lowers opportunities for adequate sanitation and hygiene because of a lack of facilities	“causing harm” domain of pathways (e.g., infectious diseases)
Limits access to essential goods and services because of physical distance, mobility, and communication challenges	Social vulnerability
Exacerbates challenges related to social isolation, stress, and mental health because of uncertainty	Social vulnerability

Our study provides the basis for designing future research protocols that deepen our understanding of the experiences of people living outdoors and how they vary within individuals, across populations, and over time. Questions could be built around the simplified categories of detriments and benefits we observed (Table 2), and our findings suggest that such questions should allow for open-ended responses about the conditions under which benefits or detriments are experienced and the health-related outcomes in which they result. This will allow for a more systematic understanding of the contingencies identified in section 4.4 and help inform the construction of a framework with hypothesized, testable relationships. Questions about how individual-level choices are made in response to changing conditions would offer important insights into adaptive capacity, and should include a detailed description of biophysical and social settings.

One area for future theoretical development and testing are the connections between therapeutic landscapes and nature-health benefits. We drew from both literatures in designing our study and interpreting our results, recognizing the distinct theoretical and methodological traditions that support them. But we have not fully engaged with areas of dissonance between the two. Bell et al. (2019) have laid an important foundation for this work with their discussion paper on the limitations of dose-response frameworks, and incongruencies between those approaches and those used in health and cultural geography. This topic warrants future attention, perhaps first in a review article.

Finally, and practically, the importance of nature in creating therapeutic experiences goes far beyond public natural areas. Research has shown the therapeutic or health-promoting value of nature in indoor settings (Jo et al., 2019; Perrins et al., 2021), as well “backyard” settings and immediate outdoor residential neighborhood settings (Finlay et al., 2015; Frumkin et al., 2017). These findings, coupled with those from our study, suggest a great potential to promote health by designing nature into everyday life for people living in shelters, transitional housing, tiny house villages, public housing, and other places that provide shelter for a population that has experienced disproportionate trauma. Important work in the realm has created healing gardens for military service members and veterans, people recovering from illness and injury, and hospice patients (Marcus and Sachs, 2014). But such interventions have been less incorporated into short- and long-term housing solutions for people who currently or have previously experienced homelessness, and should be considered, especially given the role CRT suggests for institutions in providing access to natural, restorative environments. Some have even suggested and attempted using public natural areas as part of a temporary shelter solution, with sanctioned camping areas that are appropriately staffed and resourced through partnerships with social service entities (Bottorff et al., 2012). This requires further study.

6. Conclusion

This article explored questions about nature-health relationships for people experiencing unsheltered homelessness in public natural areas in the Seattle metropolitan area. We interviewed environmental, social, and law enforcement professionals working across this urban-to-wildland system, to hear their observations across many types of places where people camped, ranging from national forests to city parks. Interviewees observed distinct physical and mental benefits and detriments for people camping in public natural areas, related to biophysical, social, and weather conditions. Some observed the use of these areas as therapeutic landscapes or restorative settings, while others perceived them as presenting unequivocally detrimental hazards. Most, however, described highly contingent outcomes, aligning with seasonal environmental conditions, changing social needs and environments, inconsistent enforcement or management actions, and vulnerable personal circumstances. These findings are important because they help illuminate the personal and social dynamics of homelessness in public natural areas, and the functions natural areas serve for this population. This knowledge should be further developed to better inform the ways

environmental agencies manage public natural areas that receive day and overnight use by homeless populations, and how both environmental and social service agencies interact with this vulnerable population. Our intention is that this research will motivate and provide a foundation for future research that directly and comprehensively assesses exposures and health outcomes for homeless populations that reside in public natural areas.

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Ethics approval

The University of Washington Human Subjects Division reviewed this project and determined that the activity qualified for exempt status.

CRediT authorship contribution statement

Monika M. Derrien: Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing. **Gregory N. Bratman:** Conceptualization, Funding acquisition, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing. **Lee K. Cervený:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Investigation. **Chaja Levy:** Formal analysis, Methodology, Writing – review & editing, Investigation. **Dale J. Blahna:** Conceptualization, Funding acquisition, Methodology, Writing – review & editing. **Paulo Frank:** Writing – original draft, Writing – review & editing. **Naomi Serio:** Investigation, Writing – review & editing, Methodology.

Declaration of competing interest

The authors declare no conflict of interest.

Data availability

The authors do not have permission to share data.

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