

Potential for conflict between urban coyotes and people experiencing unsheltered homelessness

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Across North America, both unsheltered homelessness and human–coyote (*Canis latrans*) conflict are increasing, but the relationship between these phenomena has not been thoroughly explored. We synthesize literature-based evidence with anecdotal observations that occurred during a 15-year study of coyotes in Edmonton, Canada, to describe three likely types of conflict in the context of unsheltered homelessness. First, people and coyotes often seek similar habitat, increasing opportunities for habituation and competition. Second, food conditioning, which strongly predicts conflict, may occur when coyotes access food in human encampments. Third, use of human-dominated areas caused by habituation and food conditioning may increase human exposure to zoonoses, including the priority disease alveolar echinococcosis. These sources of conflict with coyotes and other wildlife species might be limited by reductions in homelessness and the factors that cause it, wider adoption of interdisciplinary research, improved support for people experiencing homelessness, and education for professionals who engage with the homeless community.

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Urbanization is generally detrimental to wildlife, but some species have adapted to living in cities (Soulsbury and White 2015) and are subsequently involved in human–wildlife conflict. Conflict occurs when wildlife represent a real or perceived threat to humans, their well-being, or property (Soulsbury and White 2015). Globally, human–wildlife conflict is increasing (Nyhus 2016). In North America, where coyote (*Canis latrans*) ranges have expanded in recent decades, coyotes are involved in numerous forms of human–wildlife conflict (Gompper 2002), which is also increasing (Lukasik and Alexander 2011; Farr *et al.* 2023).

In a nutshell:

- Both unsheltered homelessness and human–coyote conflict are rising in North America, but the connection between these issues is unexplored
- We integrated information from the ecological and social sciences literature with anecdotal field observations to describe three likely types of conflict: increased spatial overlap leading to competition between people and coyotes, food conditioning of coyotes following access to human food in encampments, and human exposure to parasites
- Conflict may be reduced through interdisciplinary research, support for those experiencing unsheltered homelessness, and education for professionals; ideal interventions would address and eliminate the root causes of homelessness

People play a central role in human–wildlife conflict but both conflict and its management are inequitably distributed among demographic groups (Schell *et al.* 2020). For example, as compared to high-income people, low-income people are exposed to more environmental hazards (Schell *et al.* 2020); likewise, as compared to their less affluent counterparts, areas that are more affluent tend to have more green spaces and habitat for wildlife (Hope *et al.* 2003). One population that is near-absent from ecological discussions of human–wildlife conflict is people experiencing homelessness.

Unsheltered homelessness can be defined as lacking a fixed nighttime residence in a place designed for sleeping (Parker 2021). People experiencing unsheltered homelessness (PEUH) may reside in vehicles, abandoned buildings, transit facilities, or parks and open spaces. Although unsanctioned and typically illegal, encampments exist in many cities (Rose 2017; Parker 2021), raising numerous environmental justice concerns (Mitchell 2003; Herring 2014; Sparks 2017; Hopper 2019; Rastandeh *et al.* 2025), such as those related to public health (Nichols and Mays 2021; Olson and Pauly 2021) and exposure to environmental risks and hazards (Hardenbrook *et al.* 2022; Van Tol *et al.* 2025). These vulnerabilities are worsening given climatic variability worldwide (Fogel 2017; Vickery 2018; Kidd *et al.* 2021). Despite increasing homelessness globally (UN 2020), there is a dearth of research considering the relationships—both positive and negative—between PEUH and urban wildlife who may occupy the same unbuilt urban spaces, although these relationships may exacerbate the inequities that influence many aspects of urban ecology (Schell *et al.* 2020).

In cities across North America, ongoing increases in populations of both PEUH and bold, urban coyotes necessitate determining the prevalence and consequences of

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interactions between these groups. Doing so could facilitate the identification and implementation of policies that support a vulnerable population of people while contributing to human–wildlife coexistence for all community members. Here, we integrate information from the scholarly literature to describe three potential intersections between urban coyotes and PEUH, with support from anecdotal field observations made during our long-term work on urban coyotes in Edmonton, Canada, a city in which both the number of reports of bold coyotes (Farr *et al.* 2023) and the number of people experiencing homelessness (Figure 1) (Kolkman 2018; ESPC 2023) have increased. Specifically, we propose that intersections between urban coyotes and people experiencing homelessness include (1) site competition resulting from spatial overlap, both simultaneous and sequential; (2) food conditioning stemming from access by coyotes to human food sources; and (3) zoonotic diseases, especially a novel strain of tapeworm that has become prevalent in Alberta and is now spreading across North America. We synthesize relevant literature with our anecdotal observations about each of these interactions to encourage further investigation, particularly interdisciplinary research that could advance solutions to social and ecological problems and inequities applicable to this and other contexts of human–wildlife conflict.

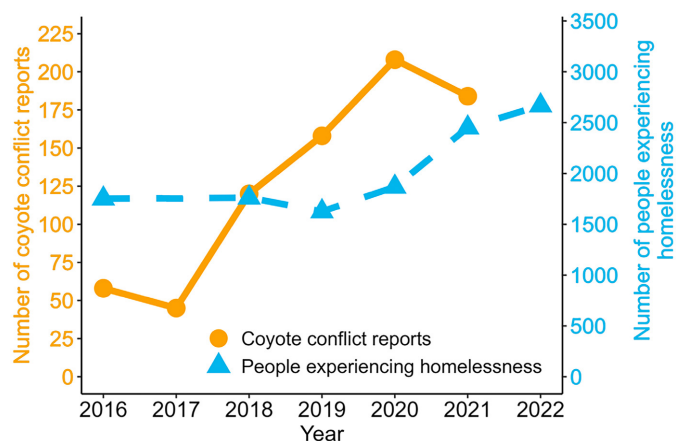


Figure 1. The number of community-sourced reports of coyotes exhibiting conflict behavior (circles) and the number of people experiencing homelessness (triangles) in Edmonton, Canada, 2016–2022. Data for reports of coyote conflict were sourced from the Edmonton Urban Coyote Project reporting database (Farr *et al.* 2023) and include interactions in which coyotes intimidated, approached, or attacked humans or their pets. Reports were submitted by members of the public voluntarily and are not corrected by survey effort. The number of people experiencing homelessness in 2016 was derived from a single point-in-time count (Kolkman 2018). The number of people experiencing homelessness (2018–2022) was sourced from quarterly censuses via a By-Names List (ESPC 2023) and then averaged within each year. The correlation shown here is intended to demonstrate that both phenomena are increasing and require mitigation. The figure is not meant to imply that homelessness causes conflict with coyotes.

Hypothesized conflict 1: spatial overlap leading to competition for sites

Urban wildlife often occupy green spaces (Nielsen *et al.* 2014), which are also selected for shelter by PEUH, especially as encampment sites (Baur and Cervený 2019; Koprowska *et al.* 2020; Shin 2023; Pitas *et al.* 2024). In Edmonton, where there is an extensive riverine system of natural areas, researchers frequently encountered encampments incidentally while searching for suitable sites to live-trap and collar coyotes that were unlikely to be visited by recreationists and dogs (eg Murray *et al.* 2015). More recently, while following ~500 km of coyote trails in snow to detect 120 coyote dens (Raymond and St Clair 2023a), we encountered 73 vacant encampments in the course of maintaining situational awareness during urban fieldwork (Appendix S1: Panels S1 and S2; Raymond *et al.* 2024). In both contexts, we observed that PEUH and coyotes used similar areas.

Although spatial overlap is not a form of conflict per se, it is a core prerequisite for many forms of human–wildlife conflict (Herrero *et al.* 2005; Elfstrom *et al.* 2014), particularly when competition results from both parties seeking the same limited resources (Nyhus 2016) such as secure, secluded habitat with dense vegetative cover—a rarity in many cities. Hiding cover is a limiting factor for urban wildlife generally (Nielsen *et al.* 2014), and was the top feature selected by coyotes using residential yards (Murray and St Clair 2017) and denning (Raymond and St Clair 2023a) in Edmonton. Competition with PEUH who also seek secure sites for encampments was suggested by a 2016 observation in Edmonton of an active coyote den that had been purposefully excavated, which local witnesses ascribed to occupants of a nearby encampment. Of the 120 urban coyote dens that we detected in 2021, five were dug into the exposed vertical surfaces apparently created after PEUH excavated and recontoured steep hillsides to create horizontal platforms for sleeping. A discarded grocery cart provided structural support to another den. In two other examples, trail cameras deployed at separate coyote dens (one in 2023 and another in 2025) documented unidentifiable individuals who were carrying tents, tarps, and sleeping bags approach and alter each den, by filling one with woody debris and by excavating the other with a shovel. In the latter two cases, coyotes at or near the focal den subsequently relocated pups to a new location, suggesting coyote displacement.

Hypothesized conflict 2: food conditioning

Food conditioning occurs when animals associate humans with food (Herrero *et al.* 2005) and, across many species, provokes bold behavior toward people (Soulsbury and White 2015) and increases time spent in human-dominated habitat (Elfstrom *et al.* 2014). Both phenomena increase the likelihood of conflict behavior, which is difficult to reverse in food-conditioned animals (Herrero *et al.* 2005). In coyotes, consumption of anthropogenic foods leads to increased

susceptibility to disease (sarcoptic mange) and poorer body condition (Murray *et al.* 2015), elevated conflict behavior (Lukasik and Alexander 2011), and altered microbiomes (Sugden *et al.* 2020). A critical step in the food-conditioning process is the initial acquisition of anthropogenic food (Herrero *et al.* 2005; Elfstrom *et al.* 2014), which requires naturally neophobic animals to overcome a threshold of risk that occurs more readily once animals are habituated to people (Herrero *et al.* 2005) or when food can be accessed in locations where animals feel secure, such as unoccupied campsites.

In Edmonton, coyotes access anthropogenic food sources in diverse settings (Murray *et al.* 2015; Raymond *et al.* 2024), but past studies have not acknowledged potential access to food and human objects at PEUH encampments. At the 73 vacant encampments we incidentally detected while following coyote trails (Appendix S1: Panels S1 and S2; Raymond and St Clair 2023a,b; Raymond *et al.* 2024), we frequently noticed wildlife tracks in the snow suggesting that coyotes, rodents, and black-billed magpies (*Pica hudsonia*) had entered encampments and interacted with food, food packaging, or other human objects, often spread dozens of meters from the encampment's core, which we did not enter. The inability to securely store surplus food appeared to result in anthropogenic food that was accessible to wildlife. Non-food-related anthropogenic objects, such as non-food garbage, bedding, and clothing, often contained puncture marks consistent with the inter-canine distance (the distance between tips of the canine teeth) of coyotes. Playing with or chewing anthropogenic items can habituate wildlife to human objects and scents, which has previously been linked to conflict (McNay 2002). Our observations provide support for one potential mechanism identified in a previous isotopic analysis of coyote diet in Edmonton, which showed that coyotes consumed more anthropogenic food in the summer (Sugden *et al.* 2021) when seasonal encampments are more abundant.

■ Hypothesized conflict 3: zoonoses

Transmissible between wildlife and humans, zoonoses account for ~60% of emerging infectious diseases (Jones *et al.* 2008) and represent an increasingly prevalent form of human-wildlife conflict, particularly in cities, where animal density and stress are high (Murray *et al.* 2019) and where animals consume low-quality anthropogenic food, which negatively affects health (Murray *et al.* 2015; Sugden *et al.* 2020). PEUH may generally face greater risk of exposure to zoonotic parasites (Leibler *et al.* 2016), which elevates the likelihood of zoonotic infection. Mechanisms behind increased exposure include shared space with wildlife (Nizeyi *et al.* 2002) where infectious material (eg eggs) may contact hands, clothes, or pets, and persist because of limited access to hygiene facilities (Verbyla *et al.* 2021; Avelar Portillo *et al.* 2023; Anthonj

et al. 2024; Waddell *et al.* 2024). Additional risk factors for poorer health in this community of people often include poverty, physical and mental illness, and substance use (Waddell *et al.* 2024).

Exposure to zoonotic disease may be particularly acute for PEUH in Edmonton because it is the epicenter of treatment for alveolar echinococcosis (AE), which has arisen as an emerging infectious disease over the past decade (Houston *et al.* 2021), resulting in at least 52 human cases in Alberta to date (K Kowalewska-Grochowska pers comm). Remaining asymptomatic for 5 to 15 years, AE is spreading across North America following the emergence of a new strain (Massolo *et al.* 2014). The disease occurs in humans after accidental ingestion of microscopic eggs of the tapeworm *Echinococcus multilocularis*, which are present in scats of infected canids, including coyotes and domestic dogs (Massolo *et al.* 2014). In Edmonton, >50% of coyotes are infected with *E. multilocularis* (Sugden *et al.* 2020), and eggs can remain viable for up to a year in the environment, where they may be transported by wind or water to infect soil, vegetation, and water beyond the locations of scat deposition (Massolo *et al.* 2014; Barosi and Umhang 2024). Our recent field studies revealed that coyote scats occurred closer than expected to encampments (~24% odds of occurrence near an encampment center versus ~17% odds of occurrence at 120 m from an encampment center; Raymond *et al.* 2024) and that magpies commonly fed on scats within 20 m of encampments (~40%; Raymond and St Clair 2023b), potentially exacerbating environmental spread (Barosi and Umhang 2024). Besides exposure risk, susceptibility to AE may be greater for PEUH because immunocompromise, which is prevalent in this community (Leibler *et al.* 2016), is a risk factor for the disease (Houston *et al.* 2021). Disease progression may occur because this community faces numerous barriers to accessing healthcare, even where healthcare is universal (Cernadas and Fernandez 2021). Together, these factors suggest that PEUH living outdoors in green spaces, where infected coyotes and scat are abundant, may face increased exposure to *E. multilocularis*, although further research is required to objectively assess resulting disease risk.

■ Synergies among conflict types

The three interactions we described between PEUH and coyotes may be synergistic (Figure 2). Simultaneous or sequential spatial overlap with people resulting from competition increases the risk of both food conditioning in coyotes (Herrero *et al.* 2005; Elfstrom *et al.* 2014) and disease transmission to humans (Nizeyi *et al.* 2002). Food-conditioned animals more often seek out human-populated areas in search of food (Elfstrom *et al.* 2014), thereby increasing spatial overlap with people. Food-conditioned animals are also more susceptible to disease (Murray *et al.* 2015). Diseased animals may be more likely to spatially overlap or compete with humans because physiological

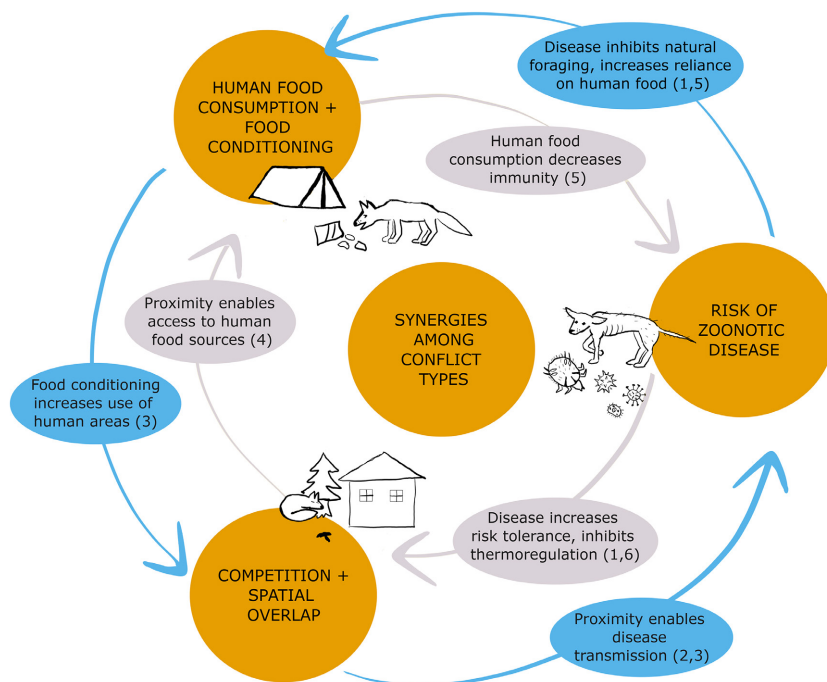


Figure 2. Hypothetical relationships and mechanisms between the three types of conflict—competition & spatial overlap, human food consumption & food conditioning, and risk of zoonotic disease—described here. Corresponding references: (1) Murray and St Clair (2017); (2) Herrero *et al.* (2005); (3) Elfstrom *et al.* (2014); (4) Nizeyi *et al.* (2002); (5) Murray *et al.* (2015); (6) Gutiérrez *et al.* (2023). Figure created by Sage Raymond using personal illustrations and Inkscape software.

stresses increase animal risk tolerance (Gutiérrez *et al.* 2023) or because human dwellings enhance thermoregulation for diseased coyotes (Murray and St Clair 2017). Diseased coyotes may select anthropogenic food subsidies owing to reduced foraging abilities (Murray *et al.* 2015; Murray and St Clair 2017). Coyotes displaced by encampments may increasingly occupy residential neighborhoods, and coyotes that become food-conditioned by accessing encampments are likely to become bolder and more diseased, suggesting that these interactions may also impact housed residents in cities.

Discussion

Recommendations

We synthesized evidence from the literature with anecdotal field observations to describe how interactions between PEUH and coyotes could increase conflict through competition mediated by spatial overlap, food conditioning, and zoonotic disease, with detrimental effects for both people and coyotes. While various policy, economic, and behavioral considerations make addressing homelessness incredibly complicated, in North America differential rates of homelessness are best explained by area relationships between income and housing availability (Colburn and

Aldern 2022). It follows, then, that the ideal long-term solution to the potential conflicts we describe is to eliminate unsheltered homelessness and the factors that cause it, namely by providing housing. As housing provision is often complex and longer term, we focus specifically on three shorter term strategies to reduce conflict given ongoing homelessness.

Increase interdisciplinary research

Despite recent increases in studies of human interactions with urban wildlife (Mackenzie *et al.* 2013; Nyhus 2016; Farr *et al.* 2023), references to PEUH are nearly absent from this literature. This research gap must be approached ethically and sensitively, while acknowledging the complex social nature of homelessness and the overrepresentation of minority groups in homeless communities (Radu 2012). We suggest that research be culturally informed, consultative, and inclusive at all stages of planning and implementation (Martinez *et al.* 2023). Interdisciplinary teams may be most effective if they not only involve people with lived experience of homelessness but also recognize and mitigate barriers these individuals may have to participating in such research. As examples, research might (i) determine whether the three types of interactions

we described above are reduced in sanctioned, concentrated, and supported encampments in urban areas with hygiene facilities versus unsanctioned, dispersed, and unsupported encampments in natural areas; (ii) quantify the frequency, magnitude, and duration of anthropogenic food subsidies and potential for food conditioning at encampments; or (iii) engage with people with lived experience of homelessness to directly assess real and perceived risks associated with urban wildlife conflict.

Provide direct support to PEUH

Because potential exposure to zoonoses represents a considerable detrimental effect of coyotes for PEUH, education about locally relevant parasites and their symptoms should be provided at places frequented by PEUH and communicated to those who support this population. Again, people with lived experience of homelessness could lead these engagements to heighten messaging acceptance. Facility and outreach workers might encourage PEUH to recognize habituated coyotes and explain how hazing coyotes can increase coyote wariness (Lajeunesse *et al.* 2023) and reduce conflict. Improved access to hygiene products (eg hand sanitizer, biodegradable soap) could reduce the risk of contracting some zoonoses (Avelar Portillo *et al.* 2023).

Educate health care services

The ubiquity and severity of zoonoses that can affect PEUH (Leibler *et al.* 2016) underscore the importance of accessible, high-quality, non-judgmental health care for this community (Cernadas and Fernandez 2021). Health care professionals should be educated about local zoonotic diseases and aware of the factors that may increase vulnerability for PEUH. For AE and the many other zoonoses that infect urban wildlife (Leibler *et al.* 2016), it is logical to apply a One Health lens, which postulates that the well-being of humans, animal populations, and ecosystems are intrinsically linked (Mackenzie *et al.* 2013). Given high rates of minority groups in homeless communities (Radu 2012), health care professionals should be culturally informed and inclusive.

Conclusions

In this article, we described potential sources of conflict between PEUH and urban coyotes that could negatively impact both people and wildlife. However, we do not advocate culling wildlife as a solution to conflict. Urban wildlife species, including coyotes, provide diverse benefits to human occupants of cities (Soulsbury and White 2015). Attempts to limit human–wildlife conflict via indiscriminate lethal management are frequently unsuccessful and are often accompanied by unintended and detrimental ecological effects (Nyhus 2016). For coyotes, eradication from cities is likely impossible (Gompper 2002) and widespread culling may increase reproductive rates (Gese 2005).

The framework for conflict that we describe here came from our experiences as ecologists studying urban coyotes in one North American city, but similar dynamics likely occur with urban-adapted wildlife around the globe and there are numerous other risks associated with urban wildlife to which PEUH may be especially susceptible (Fogel 2017; Murray *et al.* 2019; Waddell *et al.* 2024). Given global increases in both homelessness (UN 2020) and human–wildlife conflict (Soulsbury and White 2015; Nyhus 2016), recognition and study of these interactions is urgently needed and should involve diverse expertise from the social, natural, and medical sciences. Paramount to employing the recommendations we offer above is an interdisciplinary and socioecological approach (Mace 2014), which recognizes that cities are diverse mosaics of people, with different levels of privilege, discrimination, and opportunity (Schell *et al.* 2020; O'Regan *et al.* 2021; Colburn and Aldern 2022). The prevalence of marginalized and minority groups in homeless communities (Radu 2012) creates an opportunity to reduce conflict between PEUH and wildlife while cultivating social justice and promoting equity.

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Data Availability Statement

No data were collected for this study.

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