Putting the cat before the wildlife: Exploring cat owners' beliefs about cat containment as predictors of owner behavior

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Abstract
Free-roaming domestic cats pose risks to wildlife, domestic animals, humans, and importantly, the cats themselves. Behavior change campaigns that seek to minimize these risks by increasing cat containment require an understanding of the factors that predict cat owners’ containment behaviors. We conducted an online survey in Victoria, Australia (N = 1,024) to identify cat owners’ (N = 220) behaviors in containing their cats, explore beliefs and attitudes that predict containment behavior, and compare attitudes about cat containment with respondents that do not own cats (N = 804). We found that 53% of cat owning respondents do not allow any roaming. These respondents were more likely to hold concerns about risks to cats’ safety while roaming and less likely to perceive that cats have a right to roam. Concern about impacts to wildlife was not a significant predictor of containment behavior. Expectations that cat owners should manage cats’ roaming behavior was a social norm among cat owners and other respondents, and cat containers were more likely to indicate that they would try to change behaviors of their peers that they perceived to be harmful to the environment. Cat containment campaigns could be improved by appealing to owners’ concerns about cat well-being, engaging respected messengers that align with these concerns, including owners who already contain their cats.

KEYWORDS
conservation campaign, domestic cat management, environmental social science, human behavior change

1 INTRODUCTION

The impacts on wildlife of free-roaming cats (Felis catus), both owned and feral, have been well-documented. Cats have contributed to 26% of mammal, bird, and reptile extinctions globally since the year 1600 (Doherty et al., 2017), and this impact is especially great on islands, such as Australia, where fauna has evolved without exposure to cats and is not well-adapted to respond to cats’ predation threat (Salo, Korpimäki, Banks, Nordström, &
Cats are implicated in the extinction of 34 Australian native mammal species and are considered to pose an extinction risk to a further 123 species (Kearney et al., 2018; Woinarski, Burbidge, & Harrison, 2015). Feral and domestic cats are estimated to kill more than 2 billion frogs, lizards, birds, and mammals annually in Australia (Murphy et al., 2019; Woinarski et al., 2017; Woinarski et al., 2018; Woinarski et al., 2020).

Much of this impact may be attributed to feral, unowned cats, but domestic cats contribute substantially to predation on wildlife in urban areas. Predation rates per area by domestic cats in residential areas are 28–52 times higher than predation rates by feral cats in natural environments (Legge et al., 2020). Urban areas support diverse wildlife including threatened species, with 46% of nationally threatened Australian animals (almost 200 species) occurring in urban areas (Ives et al., 2016; Soanes & Lentini, 2019). Pet cats have been documented as having caused local eradication of native species populations (Bamford & Calver, 2015; Legge, Woinarski, et al., 2020), and even a single domestic cat can have major impacts on population decline and reproductive failure in a bird colony (Greenwell, Calver, & Loneragan, 2019). With an estimated 3.88 million owned cats in Australia (Animal Medicines Australia & Newgate Research, 2019) predating on 180 million wild mammals per year (Murphy et al., 2019), domestic cats are an important part of addressing threats to wildlife. However, cat owners can be naïve to the impact that their cats have on local wildlife. Studies have found that pet cats typically only bring home a proportion of the prey they have killed, with estimates ranging from 8.8% to 30% (Blancher, 2013; Kays & DeWan, 2004; Krauze-Gryz, Gryz, & Goszczyński, 2012; Loyd, Hernandez, Carroll, Abernathy, & Marshall, 2013), although there can also be high variability in hunting behavior between cats. A small number of cats may be responsible for a high proportion local wildlife predation, while others may not hunt at all (e.g., Loyd et al. (2013) found that 56% of the 55 cats in their study did not hunt wildlife).

In addition to the impacts on wildlife, allowing cats to roam freely has safety risks to cats, livestock, and humans. Cats are primary hosts to disease-causing parasites and pathogens that cause health risks to humans, wildlife, and livestock. These include protozoan parasites *Toxoplasmosis gondii* and *Sarcocystis* species, roundworm *Toxocara cati*, and bacterium *Bartonella henselae* (Hollings, Jones, Mooney, & McCallum, 2013; Legge, Taggart, Dickman, Read, & Woinarski, 2020). Financial costs attributed to impacts caused by these parasites and pathogens, some of which would not occur in Australia if not for the introduction of cats, are estimated at more than $6 billion for impacts to humans and $11.7 million for livestock (Legge, Taggart, et al., 2020).

Keeping cats contained protects cats. Trauma related injuries, including being hit by a vehicle and attacked by other animals (e.g., dogs), have been reported as the number one causes of mortality among cats attending veterinary practices, especially for younger cats (McDonald, Cleasby, Brodbelt, Church, & O’Neill, 2017; O’Neill, Church, McGreevy, Thomson, & Brodbelt, 2015). In Australia, interactions between cats and wildlife can have negative consequences for cats, including envenomation by snakes which can severely affect cats’ circulatory or respiratory systems, even resulting in death (Lawson, Langford, & Harvey, 2020). Roaming cats can be exposed to diseases, pathogens, and parasites (Webster, Mills, & Morton, 2013) and attacked by other domestic animals. Other arguments for cat containment put forward by campaigns in Australia have included reductions in unwanted cat pregnancies and in disturbances resulting in disputes with neighbors (McLeod, Hine, & Bengsen, 2015) including noise complaints and cats defecating or spraying in garden beds and children’s sandpits (Toukhsati, Young, Bennett, & Coleman, 2012).

While most predation by domestic cats occurs between dusk and dawn (Hernandez, Loyd, Newton, Carswell, & Abernathy, 2018), cats have varying impact on different species at different times of day, for example, night containment protects nocturnal species but does not protect diurnal species (e.g., some birds and reptiles, Barratt, 1997; Selinske et al., unpublished data). While a number of mechanisms have been proposed to minimize risks to cats and wildlife (e.g., night containment, bells, collars, microchipping and registration; Linklater, Farnworth, van Heezik, Stafford, & MacDonald, 2019), ultimately, eliminating risks attributed to free-roaming requires complete containment. We define this to mean that cats are either fully confined indoors, or are allowed out under restrictions such as owner-supervision, within a fenced cat enclosure, on a leash, or within a backyard or courtyard from which they cannot escape (McLeod, Evans, Jones, Paterson, & Zito, 2020).

Given the various risks associated with free-roaming cats, promoting containment is increasingly a priority by some government jurisdictions. Government regulations and community attitudes and behaviors can be highly variable across the globe, but domestic cat management to protect wildlife is prioritized particularly in areas with high endemic biodiversity, such as Australia and New Zealand (Hall et al., 2016). In the Australian state of Victoria, responsible cat ownership has been identified as a priority for behavior change campaigns by the state environment department (DELWP, 2020). Under the Victorian *Domestic Animals Act 1994*, it is an offence for domestic cats to trespass on private property, effectively mandating containment. Nonetheless, across the state, local governments vary in their messaging and bylaws.
(and their enforcement) relevant to cat ownership, including some who encourage or mandate containment at night, at least one encouraging mandatory 24-hr containment, and others placing no restrictions or guidelines on domestic cats' roaming. A recent national Australian parliamentary inquiry promoted night containment of cats and recommended that public awareness of Australia's feral and domestic cat problem needed to be raised “in a way that resonated across the community, and particularly to inform and influence pet cat owners.” (Parliament of the Commonwealth of Australia, 2020). If such messaging is to be developed appropriately, and cat containment laws or recommendations to be implemented effectively, it is critical to understand what attitudes and beliefs shape cat owners' behaviors in managing their cat and general community support for cat management.

Cats have long been embedded in human societies and are highly valued by their human owners (Crowley, Cecchetti, & McDonald, 2020b). Cats, like some other companion animals, are recognized as playing an important social role in their owners' lives, acting like a family member or friend in reducing feelings of loneliness, resulting in improvements to well-being and quality of life (Allen, Blascovich, & Mendes, 2002; Castelli, Hart, & Zasloff, 2001). As such, arguments about cat containment are seen as controversial, and cat owners' perceptions of the impacts of cats on wildlife may be further obfuscated by the spread of conflicting information shared by cat advocates and conservationists (Loss & Marra, 2018). People can hold strong opinions about cats' right to roam and suggestions to contain them can be met with opposition.

According to previous research, cat owners' behaviors in containing their cats or allowing them to roam are shaped by various factors, including concern for cat safety, cat wellbeing and freedom to access the outdoors, and the impacts of cats on wildlife (Crowley, Cecchetti, & McDonald, 2020a; Foreman-Worsley, Finka, Ward, & Farnworth, 2021; Toukhsati et al., 2012). Although a study by Elliott, Howell, McLeod, and Bennett (2019) found that two-thirds of cat owners who responded to a survey had lost a cat through a roaming incident (e.g., hit by a car), just under half considered that cats should always be contained, perhaps suggesting cognitive dissonance. Alternatively, owners may feel a conflict between motivations to contain cats, for example, concern for cats' safety conflicting with beliefs that cats benefit from or have the right to roam freely, or they may feel that they are unable to meet their cats' needs in containment (Lawson et al., 2020).

In this study, we sought to document containment behaviors among cat owners in Victoria, Australia, and identify attitudes and beliefs held by cat owners and non-owners, particularly those that predict containment by cat owners. The Theory of Reasoned Action (TRA, Fishbein & Ajzen, 1975) and its extension, the Theory of Planned Behavior (TPB, Ajzen & Fishbein, 1980), proposes that behaviors are predicted by perceived personal control in performing the behavior, social norms associated with the behavior, and attitudes towards the behavior. Attitudes are informed by behavioral beliefs that explain motivation to perform a behavior, based on perceptions of the behavior's consequences. In this case, we focused on beliefs associated with consequences of containment on cat safety, cats' freedom to roam, and impacts of cats on wildlife. We drew on these theories and community-based social marketing (McKenzie-Mohr, 2013) to understand beliefs and attitudes associated with containment behaviors and perceived barriers to or opportunities for behavior change with the aim of improving messaging in campaigns promoting cat containment. We expected that attitudes and beliefs associated with concern for cat welfare and wildlife (Crowley et al., 2020a; Foreman-Worsley et al., 2021; McLeod et al., 2015), perceived behavioral control, and social norms would predict containment behavior by owners.

2 | METHODS

2.1 | Survey distribution

This study was part of a broader survey effort collecting data pertaining to a range of pro-environmental behaviors. The survey was distributed online by a market research panel, The Online Research Unit (The ORU), in December 2020. The ORU recruits participants via email to complete surveys in exchange for a small financial reward. This was the third in a series of surveys that have been conducted annually (Hatty, Smith, Goodwin, & Mavondo, 2020; Meis-Harris et al., 2019). The first survey was open to any respondents over 18 years of age (Meis-Harris et al., 2019). While the first survey aimed to be representative of the Victorian public with respect to age, gender, and geographical location, the current survey prioritized resampling a subset of the respondents who completed the first survey. New respondents (31.5% of the total sample) were also recruited to meet the target sample size, attempting to address gaps in representation of the Victorian population. As such, there appears to be under sampling of rural (our sample: 18.5%, Victorian population: 24.5%) and younger participants (e.g., 18–29 years of age; our sample: 6.8%, Victorian population: 20.3%) and over sampling of urban and older participants (e.g., over 60 years of age; our sample: 35.8%, Victorian population: 27.2%). Perhaps reflecting the skewed age data, there is a slightly lower proportion of students and
higher proportion of retirees in the current survey compared with the 2018 survey. Other characteristics (e.g., gender, level of education) are closer to being representative (see Table S1).

### 2.2 Survey design

We developed a survey that included questions documenting cat owners’ containment behaviors and attitudes and beliefs pertaining to containment and roaming. Cat containment behaviors were recorded using two questions which asked first asked about cats’ usual living arrangements (outside all the time; inside or outside at any time; kept indoors at night and allowed out during the day; kept indoors most of the day only; allowed out for short periods during the day only; indoors at all times) and then the nature of cats’ access to the outdoors, if applicable (unrestricted access; restricted access, that is, contained in a cat run, supervised at all times, on a leash, in a courtyard from which they cannot escape; not allowed out; other). These questions were derived from a study by McLeod et al. (2020) and were intended to capture the diversity of ways in which cat owners manage their cats.

Attitudes and beliefs were documented using 12 5-point Likert-type statements (“strongly disagree” [1] to “strongly agree” [5]). These pertained to beliefs about cats’ hunting and wildlife (“A cat killing 1-2 birds a week in my neighborhood is not likely to have much of an impact on my local wildlife” and “My cat isn’t much of a hunter”); perceived behavioral control (“It would be difficult for me to keep my cat(s) contained”), social norms (“Owners have some responsibility for managing their cat’s hunting behavior”), and eight statements representing three categories of motivations to control cats or allow them to roam (Table 1). During survey preparation, the statements representing perceived behavioral control and social norms were included to represent components of the Theory of Planned Behavior (Ajzen & Fishbein, 1980). During analysis, beliefs about cats’ hunting and wildlife were considered as likely to be linked to attitudes towards cat containment, and therefore also incorporated into the Theory of Planned Behavior framework. The statements used to measure behavioral motivations were largely informed by Crowley et al. (2020a), and included statements related to concern for cat safety, cat liberties, and impacts to wildlife (Table 1). Eight of these 13 statements were also presented to respondents who did not report owning a cat or cats, including the statements about hunting and wildlife, social norms, some behavioral belief statements (e.g., “Cats hunting is a good sign of normal behavior”), and statements indicating respondent engagement with the topic (e.g., “I worry about roaming cats being lost, stolen, or killed,” “I’ve never seriously thought about the effects of cats on wildlife populations”) (Table S2). As part of a broader study exploring pro-biodiversity behaviors, we also included three measures documenting environmental advocacy behaviors relating to interactions with peers, recording whether respondents were likely to talk to their peers about environmental issues, share stories about environmental issues on social media, or try to influence peers to change behavior to benefit the environment (Table S3). These statements were recorded as “Never” or “Not applicable” (1), “Occasionally” (2), “Sometimes” (3), or

| Variable | Belief statement                                                                 | Mean (SE) | Regression weight (SE) | p    |
|----------|----------------------------------------------------------------------------------|-----------|------------------------|------|
| Safety   | I worry that my cat(s) may be injured by wildlife or other animals (e.g., neighbor’s dog or cat) | 3.25 (0.09) | 1.00                  |      |
|          | I worry about roaming cats being lost, stolen, or killed                        | 3.77 (0.08) | 1.38 (0.53)           | 0.009|
| Wildlife | I worry about the impact my cats might have on wildlife                          | 3.28 (0.09) | 1.00                  |      |
|          | I’ve never seriously thought about the effects of cats on wildlife populations*  | 2.01 (0.07) | −1.88 (0.48)          | <0.001|
| Freedom  | Cats should be able to roam where they please, like a wild animal               | 2.15 (0.08) | 1.00                  |      |
|          | Cats hunting is a good sign of normal behavior                                  | 3.03 (0.08) | 0.80 (0.04)           | <0.001|
|          | Hunting is important for a cat’s wellbeing                                     | 2.78 (0.08) | 0.89 (0.04)           | <0.001|
|          | The benefits of cats roaming outweigh the risks of them being injured or lost   | 2.43 (0.09) | 0.97 (0.04)           | <0.001|

Note: Validity of these constructs was tested using confirmatory factor analysis ($\chi^2 = 261.9$, df = 17, $p < .001$, CFI = 0.879, RMSEA = 0.119). One item (*) was reverse coded to form the new variables used in subsequent regression analyses.
“Often” (4) and were intended to assess whether cat owners who contain their cats might be good messengers for promoting containment behavior. We also collected respondent demographic information.

2.3 | Data analysis

We report on cat containment behaviors to capture the nuances of how people manage their cats, but we also recoded responses to simplify containment behaviors for the analysis. Respondents were coded as those who contain their cats at all times (i.e., always inside or only allowed outside with restrictions such as containment to a cat run) [3], who allow free-roaming during the day only [2], and who allow free roaming at night [1]. Those respondents who indicated “other” with regards to their cat’s access to the outdoors were coded based on the statement they gave describing that access.

Due to small sample size, we then simplified these responses further to a binary variable, comparing complete (24-hr) containment with all other containment behaviors (no or partial containment). This binary cat containment behavior metric was then used as the dependent variable for the remainder of the analyses. We tested the relationship of cat containment behavior with respondent age using a t-test and with gender and level of education using $\chi^2$ in SPSS (IBM Corp, 2019). Similarly, we tested relationships between cat containment and environmental advocacy statements using t-tests.

We then created three latent variables using the eight statements pertaining to motivations to contain cats (Table 1). The variables were developed based on our expectations for motivational categories (Crowley et al., 2020a), tested for validity using confirmatory factor analysis (CFA) in AMOS (Arbuckle, 2006), and refined by removing variables until all contributed significantly to the constructs. The resulting variables represented motivations based on concern for cat safety (“Safety”), prioritizing cat freedom (“Freedom”), and concern for impacts on wildlife (“Wildlife”) (Table 1). We created new variables by averaging scores for the items contributing to each statement, reverse coding responses with opposing meanings. For the advocacy statement that was found to be significantly related to containment behaviors, we tested the relationship between support for that statement and agreement with the two statements that comprised the latent variable representing concern about wildlife using simple linear regressions.

Finally, we conducted multiple hierarchical binary regression (Wong & Mason, 1985) to identify the capacity of attitude and belief statements to predict cat containment behavior. Specifically, the models comprised (Step 1) the latent variables representing potential containment motivations indicated above, (Step 2) statements pertaining to beliefs about cats’ hunting, perceived behavioral control, and social norms, and (Step 3) all of these items combined (Table 2). We did not include demographic variables in the regression because they were not significant predictors of behavior. Model fit among these three models was compared using change in Akaike Information Criterion.

3 | RESULTS

The survey obtained 1,024 responses, 220 of which reported that they owned one or more cats. Five respondents were removed because they did not pass quality assurance checks or they gave inconsistent answers about their cat containment behaviors (i.e., said their cat was not allowed outside, and then said they had unlimited access to outdoors in a subsequent question). The total sample comprised 48.5% women and averaged 51.82 ± 0.48 (SE) years of age (range: 20–89 years). The subset who reported to own cats comprised 55.81% women and averaged 51.43 ± 0.96 years of age (range: 23–84 years).

3.1 | Attitudes and beliefs about cats and cat owners’ responsibilities

Cat owners were more likely than respondents without cats to agree with the statements “I worry about roaming cats being lost, stolen, or killed” (owner mean ± SE = 3.77 ± 0.82, non-owner = 3.00 ± 0.05, $t = 8.239, DF = 359.75, p < 0.001), “Cats hunting is a good sign of normal behavior” (owner = 3.03 ± 0.08, non-owner = 2.65 ± 0.04, $t = 4.243, DF = 340.65, p < 0.001), and “The benefits of cats roaming outweigh the risks of them getting injured or lost” (owner = 2.43 ± 0.09, non-owner = 2.24 ± 0.04, $t = 2.06$, DF = 315.46, p = 0.04). Cat owners were less likely than respondents without cats to agree with the statement “I’ve never seriously thought about the effects of cats on wildlife populations” (owner = 2.01 ± 0.08, non-owner = 2.51 ± 0.05, $t = -5.70$, DF = 394.90, p < 0.001). There were no significant differences in responses to the remaining four statements (all comparisons provided in Table S2). Notably, this included attitudes towards the statement “Owners have some responsibility for managing their cat’s behavior” (owners = 4.28 ± 0.07, non-owners = 4.33 ± 0.03, $t = -0.64$, DF = 336.56, p = 0.53).

We considered the model fit for the three latent variables representing motivations for containment behavior to be acceptable ($\chi^2 = 261.9, df = 17, p < 0.001$, CFI =...
0.879, RMSEA = 0.119). Of the three variables (Table 1) freedom concerns were positively correlated with safety concerns ($\beta = 0.189 \pm 0.077, p = 0.014$) and negatively correlated with wildlife concerns ($\beta = -0.358 \pm 0.091, p < 0.001$), and there was no significant relationship between wildlife and safety concerns ($\beta = -0.020 \pm 0.021, p = 0.349$).

### 3.2 | Cat containment behaviors

Recoding of responses about cat containment behaviors (Figure 1) resulted in 37 (17.21%) who allowed their cats unrestricted access to the outdoors day and night, 64 (29.77%) who contained their cats at night only but allowed some unrestricted day time access, and 114 (53.02%)...
who did not allow their cats any unrestricted access to the outdoors.

Comparing between people who completely contain their cats (“containers”) and those who do not (“non/partial-containers”), we found no significant difference in age (container mean = 52.20 ± 1.42 years, non/partial-container = 51.01 ± 1.34 years, \( t = 0.611, \) DF = 213, \( p = 0.542 \)), level of education (\( \chi^2 = 9.563, \) 8 = DF, \( p = 0.297 \)), or gender (\( \chi^2 = 0.861, \) DF = 1, \( p = 0.353 \)). Among advocacy behaviors, there was no significant difference between cat-containers and non/partial-containers in whether respondents were likely to bring up environmental issues in conversation with their peers or to share material about nature or environmental issues on social media (see Table S3). However, cat-containers (mean = 2.56 ± 0.09) were more likely than non/partial-containers (mean = 2.25 ± 0.11, \( t = 2.16, \) DF = 202.60, \( p = 0.032 \)) to agree with the statement “I try to encourage others to change behaviors that I believe are harmful to the environment.” There was a positive relationship between this statement and agreeing with the statement “I worry about the impact my cats might have on wildlife” (\( R^2 = 0.02 ± 1.12, \) \( p = 0.047 \)) and a negative relationship with the statement “I’ve never seriously thought about the effects of cats on wildlife populations” (\( R^2 = 0.01 ± 1.11, \) \( p = 0.002 \)).

We found that the four statements representing beliefs about cats hunting, perceived behavioral control, and social norms about containment were all significant predictors of containment behavior (Figure 1). As such, we included these measures in the hierarchical logistic regression (Table 2).

Even though cat containers were more likely to believe that their cat was a hunter and has impacts on local wildlife (Figure 2, Table S4), the regression analysis revealed that concerns about cats’ impact on wildlife provides little explanatory power in predicting whether cat owners contain their cats (Table 2). Concerns for cat safety were positively correlated with containment, whereas holding beliefs about cats’ rights to or benefits from access to freedom were negatively correlated with containment.

4 | DISCUSSION

We explored a range of attitude and belief statements as predictors of cat containment behaviors among a sample

![Figure 2](image-url)

**Figure 2** Comparison between people who never allow their cat to roam freely (containers) and people who sometimes or always do (partial/non-containers) in their support for statements associated with beliefs and norms about cat containment and factors associated with motivations to contain cats. These comprise hunting impact (“A cat killing 1-2 birds a week in my neighborhood is not likely to have much of an impact on my local wildlife”), hunting frequency (“My cat isn’t much of a hunter”), control (“it would be difficult for me to keep my cat(s) contained”), norms (“Owners have some responsibility for managing their cat’s hunting behavior”), and factors representing concern about cats’ safety, concern about impacts on wildlife, and concern about cats’ rights to roam (see Table 1). Error bars represent standard error of the mean. Differences between cat containers and partial/non-containers for all items are significant (\( p \leq 0.005 \)) based on \( t \) tests (see Supporting Information).
of cat owners. The most important predictors of whether someone fully contained their cat were concerns about cat safety, concerns about cats’ right to roam, perception of one’s ability to contain their cat, and beliefs about their cats’ hunting. These findings align with previous studies that concerns for cats, such as their mental or physical wellbeing, and perceived behavioral control are stronger predictors of containment behavior than concern about impacts on wildlife (MacDonald, Milton, & Gavin, 2015; McLeod et al., 2015).

The findings also align with the Theory of Planned Behavior in demonstrating that behavioral beliefs, perceived behavioral control, and social norms are predictors of behavior. We can draw upon an understanding of these variables to improve behavior change campaigns by developing messaging that accords with salient behavioral beliefs, leveraging or increasing social norms, removing or addressing barriers to behavior change, and employing effective messengers (McKenzie-Mohr, 2013; McLeod et al., 2015).

4.1 Campaign messaging

The negative correlation between concern about cats’ access to freedom and concern about impacts on wildlife, suggests that messaging about impacts on wildlife will be ineffective at reaching people whose behavior is driven by freedom concerns. For these people, messages about what containment means (i.e., not just locked inside) and messages about cats’ needs being met in containment are more likely to be effective in promoting containment. Educational material that helps people understand how to meet the mental and physical needs of cats in containment may support this, for example, providing social stimulation (playing with owners or other animals) and enrichment activities (e.g., toys, climbing structures, scratching surfaces) and food types that simulate natural behaviors (Ellis, 2009; Jongman, 2007; Lawson et al., 2020; Toukhatsi et al., 2012). Such approaches are incorporated into the Zoos Victoria “Safe Cats, Safe Wildlife” and RSPCA Australia “Safe and Happy Cats” campaigns. Previous studies may suggest a cognitive dissonance between experiencing impacts to cat’s safety as a result of roaming and the potential to minimize this risk through containment (Elliott et al., 2019). However, the importance of safety concerns as a predictor of containment and the positive relationship between safety and freedom concerns suggest that this cognitive dissonance might be overcome by improving cat owners’ understanding of how to balance concerns for cat welfare in containment and concerns about risks of roaming. Messaging to address this might best be delivered by veterinarians, who are respected by pet owners in providing advice that benefits pets’ safety and wellbeing (Linklater et al., 2019; MacDonald et al., 2015).

This messaging needs to be about demonstrating that cats’ physical and mental needs can be met in containment and that containment does not just mean staying inside. There are a variety of mechanisms that can be employed to prevent cats from roaming. Building a cat run can be expensive, but simpler modifications to fences, such as installation of netting or rollers (e.g., Oscillot®) that prevent jumping fences, and placing metal bands around trees to prevent climbing, may be adequate to contain cats within suburban backyards (Animal Welfare Victoria & Agriculture Victoria, 2021). Respondents who did not contain their cats were more likely to think that it would be difficult for them to do so. This may be obvious, in that people who are containing their cats know that it is possible, but may also hint at perceived logistical barriers to changing behaviors. This might present an opportunity for councils to not only educate residents about their options for implementing containment of their cat, but potentially to subsidize installation of tools that make it easier to do so.

While concern for wildlife was not an important predictor of containment behavior, people who did not fully contain their cat were more likely to think that their cat is not much of a hunter. Thus cat owners who may not currently be concerned about the risk their cats pose wildlife, may also be unaware of this risk. This suggests that there is a place for education campaigns around cats catching more than they bring home. Video messages that incorporate information about cats’ impact on wildlife were found to be similarly effective at promoting containment behaviors compared with video messages only about the benefits of containment on cat safety (McLeod, Hine, Bengsen, & Driver, 2017). As such, whether messaging about impacts on wildlife are effective at promoting containment behaviors might depend on the nature of that messaging. Messaging that directly addresses misconceptions that cat owners hold about the risk that their cats pose to wildlife may potentially be more effective than messages that simply report on the impacts cats cause to wildlife. These could be informed by community-based studies that reveal the true extent of cats’ roaming and hunting behavior. For example, a citizen science project titled “Cat Tracker” in South Australia allowed cat owners to monitor roaming behavior using GPS trackers attached to their cat’s collars. This resulted in changed perceptions about how far cats roam. Increases in containment behavior (to full containment or night containment) or intention to contain were observed not only among participants in the study, but
also among other members of the community who were aware of the study (Roetman, Tindle, & Litchfield, 2018).

Our consideration of advocacy behaviors and cat containment provides evidence that communication between cat owners may contribute to promoting containment among those owners. Given that concern about impacts on wildlife was not an important predictor of containment behavior, it is unsurprising that there was no relationship between most of the environmental advocacy statements and cat containment. However, people who contained their cats were more likely to claim that they try to change the behaviors of others to benefit the environment and people who made that claim were also more likely to be concerned about the impacts of cats on wildlife. People tend to be persuaded more by messages delivered by in-group members than out-group members, especially when the message (e.g., cat containment) is relevant to the defining characteristic of the group membership (e.g., cat ownership; Wyer, 2010). Cat owners who contain their cats may therefore be an important resource as messengers about containment behavior to their cat-owning peers. To make the most of this opportunity, campaigns to promote containment might focus on giving cat containers the tools they need to effectively communicate with their peers about cat containment, such as resources and messages that may be effective. Vocal cat containers may help to increase social norms about cat containment. Additionally, as concern for wildlife was not a key driver of cat containment behavior, focusing containment messages on the benefits to the wellbeing and longevity of cats who are contained may resonated more with cat owners than messages that may be perceived as “anti-cat” (i.e., ones that focus solely on the impact cats can have on wildlife).

4.2 | Social norms

Cat containment behaviors vary across cultures and geographies. A recent national review of studies in Australia estimated that cat containment rates are around 29% (Legge, Woinarski, et al., 2020), although it is unclear whether the definition of containment used in that study encompasses the diversity of ways in which cats’ roaming is managed. Australian cat owners show higher rates of containment than other comparable nations (e.g., less than 10% of New Zealanders contain their cats to their property; Bruce et al., 2019; Linklater et al., 2019), higher levels of concern for the impacts of cats on wildlife, and comparatively high support for restrictions on allowing cats to roam freely (Hall et al., 2016). More than half of our respondents fully contained their cats and a further third contain them at night. We recognize that small sample size may be a limitation in generalizing about our findings, and that while The ORU aimed to achieve a representative sample of Victorians in the first survey (Meis-Harris et al., 2019), the subset resurveyed in this study may not be representative, and the smaller subset who own cats may not be a representative sample of cat owners. Nonetheless, we considered this to be a promising result in working towards higher rates of containment, particularly given that owners who are containing at night may be more amenable to 24-hr containment (Linklater et al., 2019). Cat containment in Australia appears to have increased since advocacy campaigns began in the late 1990s (Hall et al., 2016; Lilith, Calver, Styles, & Garkaklis, 2006; Linklater et al., 2019). This may suggest growing social norms about cat containment among cat owners, and a likelihood that containment behaviors will continue to become more prevalent. In addition, we found that cat owners and non-owners alike supported the suggestion that cat owners have a responsibility to manage cat behaviors (although they may have different ideas about what management should entail), and others have found that non-owners are more likely to support the suggestion that cats should be contained (Elliot et al., 2019; Grayson, Calver, & Styles, 2002).

Several local government councils in Victoria have implemented cat containment by-laws, although our sample size was insufficient to test whether by-laws were a predictor of containment behavior. Cat ownership is banned in some localized areas due to concerns about impacts on wildlife (e.g., Bend of Isles, Botanic Ridge) and at least one council requires 24-hr cat containment (Yarra Ranges Shire Council). Restrictions on cat ownership and mandating containment may seem to be an obviously powerful tool in reducing the prevalence of free-roaming cats, but there may also be problems with compliance (McLeod et al., 2015) and difficulties with implementing enforcement (Toukhsati et al., 2012). For example, while the Domestic Animals Act 1994 makes it an offence for cats to trespass on private property, we are still a long way from achieving 100% cat containment. Nonetheless, an increasing focus on encouraging containment among councils may help strengthen social norms.

5 | CONCLUSION

This study contributes to the growing literature exploring cat owners’ motivations and perceived barriers to containing their cats. Cat containment campaigns can be more effective if they design messaging that align
with cat owners’ concerns for their cats’ wellbeing and engage messengers who fit with these messages and who cat owners respect or relate to. Messages about the impacts of cats on wildlife may be relevant if they address cat owners’ misperceptions about the risks their cats pose to wildlife, but may otherwise not be as important as addressing cat welfare concerns in changing behavior. Campaigns that focus on helping cat owners understand that cats’ needs can be met in containment, and giving them the tools they need to achieve this, may be the most effective pathway to reducing the risks of cats roaming, including predation risks on wildlife.

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**CONFLICT OF INTEREST**

The authors declare no conflicts of interest.

**AUTHOR CONTRIBUTIONS**

Lily van Eeden led the survey design, data analysis, and preparation of the manuscript. All authors contributed to survey design, interpretation of the data, and writing and editing the manuscript.

**DATA AVAILABILITY STATEMENT**

The data used for this study is available upon reasonable request from the corresponding author.

**ETHICS STATEMENT**

This study was approved by the Monash University Human Research Ethics Approval Committee (Project ID 26645).

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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