Predicting peoples' motivation to engage in predator control

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Summary

Governments use policy interventions such as education, incentives, and regulations to change peoples' behaviour and thereby achieve their policy objectives. Understanding and predicting the willingness of people to change their behaviour in response to an intervention is critical in assessing its' likely effectiveness. We present a framework proposed by Kaine et al. (2010) for understanding and predicting the motivation of people to change their behaviour in response to a policy intervention. The framework draws on the marketing concept of 'involvement', a measure of motivation. Through application to a predator control case study we show how the framework may be used to predict peoples' responses to a policy intervention and how these predictions might assist agencies to develop strategies to promote behaviour change.

Keywords

Predator control; motivation; urban; possum; New Zealand

Introduction

The potential for people in urban areas to contribute to predator control by trapping introduced brushtail possums is of national interest in New Zealand as a component of the Predator Free 2050 vision (Russell et al. 2015). This potential can, in principle, be realised by using a range of policy interventions, including marketing, education, incentives, charges and regulations to stimulate interest, encourage participation, and modify behaviour and practice. For example, participation in an urban programme of possum trapping could be encouraged by offering incentives to households to install and monitor traps.

Choosing which policy intervention to employ depends on several factors, with the likelihood of householders responding favourably being, perhaps, the most critical. For example, incentives could be popular among householders but prohibitively expensive given the trapping densities that may be required. Regulations compelling the installation of traps could have the potential to change the behaviour of all households but may be unpopular among householders and problematic to enforce. Hence, knowing the likely response of householders to any proposed policy intervention is crucial when choosing between policy interventions (and knowing when there may be merit in combining them).

In this study, we use a framework based on social psychology and marketing theory (Kaine et al. 2010) to investigate the responses of urban households to a policy that would promote the use of traps to reduce the population of possums in Dunedin (PF2050 2020). Although there is an established literature on the ecology of common urban pests, such as rats (Feng and

Himsworth 2013, Himsworth et al. 2014, Younsteadt et al 2014), the New Zealand literature on the economic or social impacts of urban predators is extremely limited. Wilson et al. (2017) mainly investigated the public health aspects of rat, stoat and possum eradication in Wellington but also cite the potential social benefits to residents' mental health. This research is the first study, to the best of our knowledge, that explores New Zealander's motivation to participate in urban predator control.

Theory

Kaine et al. (2010) suggested that theories about peoples' responses to policy interventions had a common underpinning, whether those theories were grounded in the economics of rational choice or were more behavioural in nature, incorporating social and normative motivations. The common underpinning was that people's decision-making was motivated by the achievement of personal goals, and that the decisions are sufficiently important to the individual for them to devote cognitive effort to gathering information, processing that information and formulating attitudes, and reaching a decision (Priluck and Till, 2004; Herr and Fazio, 1993; McLeod et al. 2015).

Given these underpinnings, these theories cannot be expected to predict behaviour when a decision is not relevant enough to people's personal goals to warrant the effort to form an attitude that has the power to influence their behaviour. In these circumstances, due deliberation does not take place in reaching a decision. Consequently, to predict how people may or may not respond to a policy intervention it is necessary to understand if they likely to invest effort in decision-making regarding the intervention.

Social psychology theory suggests that, given limited capacity to process information, individuals must form priorities so they can allocate their processing capacity (Derbaix and Vanden Abeele, 1985). The theory proposes that deliberate, effortful thinking is reserved for more important decisions while automatic processes that require less effort, such as habit, are employed to make routine, unimportant decisions. Hence, when a person is presented with a decision-making situation they must, consciously or subconsciously, evaluate the importance of the decision to determine the level of deliberate, effortful thinking they should invest in it (Derbaix and Vanden Abeele, 1985).

The importance or personal relevance of a decision is judged on the extent to which it is perceived to influence a person's capacity to satisfy their needs (Assael, 1998; Oliver, 1997). A person's perception of the importance of a decision in relation to the satisfaction of their needs represents their 'involvement' with the decision. Hence, involvement is a measure of the intensity of a person's motivation regarding a decision (Verbeke and Vackier, 2004). The intensity or level of involvement evoked by the decision depends on a mix of external cues, including context and promotion, and internal cues, such as experience, perception of risk, personal value systems and social norms (Assael, 1998).

The degree of involvement a person has in a subject is a key determinant then, of the effort they will expend in making decisions about that subject, and then acting on them (Celsi & Olson, 1988; Poiesz & Cees, 1995). Involvement arises from functional needs in relation to comfort and security, experiential needs in relation to feelings of pleasure and reward, and identity needs in relation to self-expression and belonging (Laurent & Kapferer, 1985). Involvement tends to be higher the more the subject of interest is novel, complex, and entails

substantial social and financial risks (Dholakia, 2001). Consequently, involvement can be characterised in terms of functional, experiential, identity-based, risk-based, and consequence-based components (Laurent & Kapferer, 1985).

A person's involvement with a subject will be greater the more they associate each of these component needs with the subject. Farmers, for example, should exhibit very high involvement with farming because it provides them with an income (functional involvement), with the opportunity to be physically active and work outdoors (experiential involvement), and to work independently of others (identity involvement). Farming is characterised by long production cycles that are sensitive to seasonal conditions, and product prices are highly variable. Consequently, production and revenue performance are inherently unpredictable (risk-based involvement) with serious consequences for business success and family income (consequence-based involvement).

High involvement with a subject is associated with greater time and effort devoted to obtaining information about the subject, the formulation of strongly held beliefs and attitudes about the subject, and greater likelihood of acting regarding the subject. In contrast, low involvement in a subject is associated with little time and effort devoted to obtaining information about the subject, the formulation of weakly held beliefs and attitudes, if any, about the subject, and a lower likelihood of acting regarding the subject.

Kaine et al. (2010) proposed that people's responses to policy intervention, such as the subsidised provision of traps for catching possums for example, can be inferred from their:

- involvement with the relevant policy outcome (such as reducing possum numbers)
- involvement with and attitude towards the policy intervention itself (subsidised traps).

The two dimensions of involvement with the policy outcome and involvement with the policy intervention mean that the responses of people to a policy intervention can be classified into four quadrants as shown in Figure 1.

People in quadrant 1 exhibit low involvement in both the policy outcome and the policy intervention. These people are likely to have little knowledge or even awareness of the policy outcome. They are likely to have limited knowledge of the policy intervention and have weak attitudes towards it, if any at all. Non-compliance with the intervention is largely unintentional (Murdoch et al. 2006).

If people in quadrant 1 present little risk in terms of achieving the policy outcome, they can be ignored. Otherwise, their compliance with the intervention may be encouraged by:

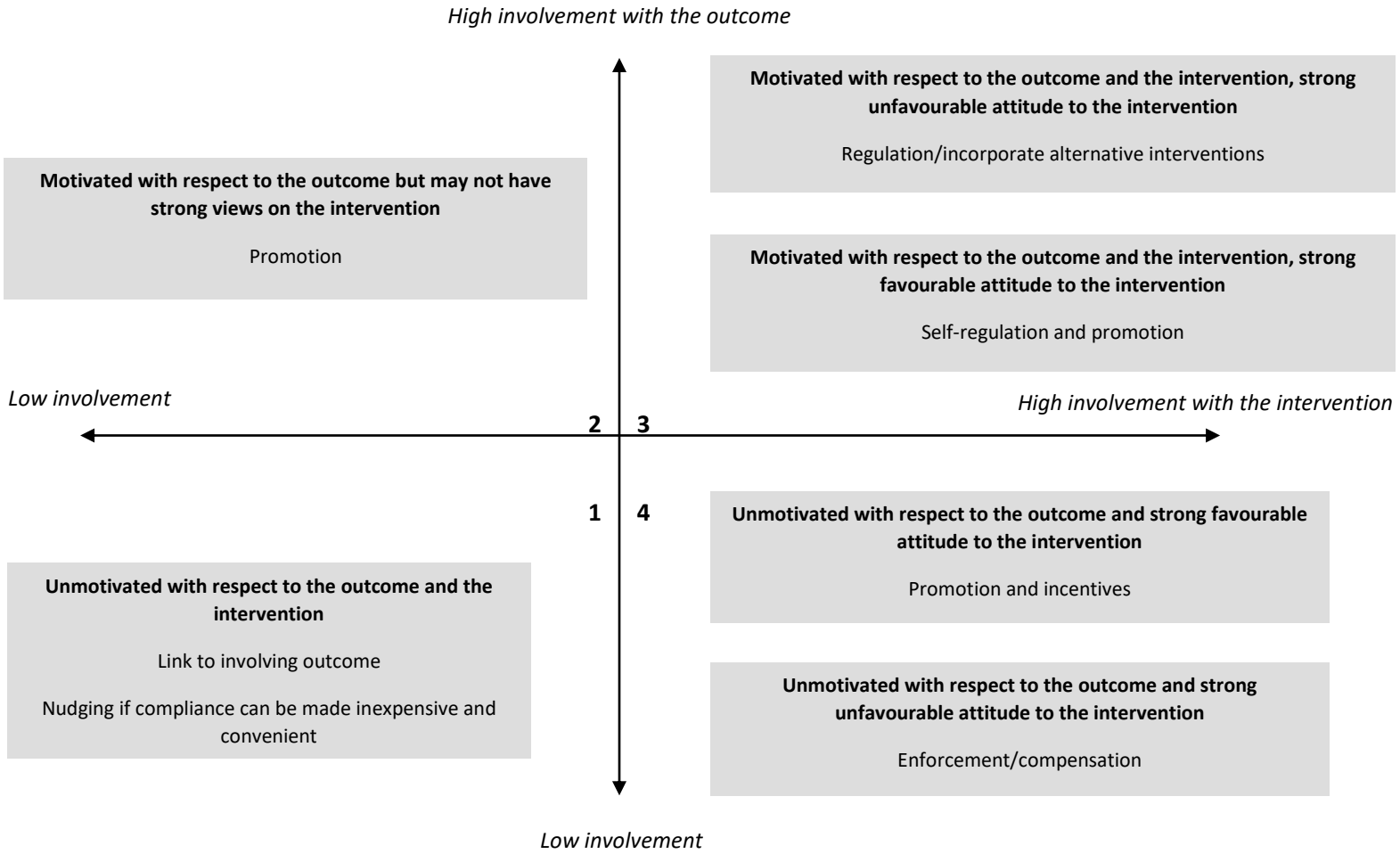
- linking the policy outcome to a subject they find more involving
- reducing the effort required to be compliant, and
- promoting awareness of the policy outcome and the policy intervention.

The last strategy is likely to be ineffective.

People in quadrant 2 exhibit high involvement with the policy outcome but low involvement with the intervention. These people are likely to have some knowledge about the policy outcome. They are likely to have limited knowledge of the policy intervention and may have weak or ambiguous attitudes towards it. Any non-compliance with the intervention is largely unintentional (Kaine et al. 2010). If people in quadrant 2 represent little risk in terms of achieving the policy outcome, they can be ignored. If their compliance is important to achieving the policy outcome, then reducing the effort required for compliance (Thaler & Sunstein, 2008) and promoting awareness of the policy intervention may be worthwhile.

Figure 1. I_3 Response Framework.

Bold text describes the strength of motivation with respect to the policy outcome (e.g. reducing possums) and the policy instrument (e.g. subsidised traps). Plain text describes potential policy measures to promote compliance with the policy instrument. (Source: adapted from Kaine et al. 2010)



People in quadrant 3 exhibit high involvement with the policy outcome and the intervention. These people are likely to have extensive and detailed knowledge of the policy outcome. They are also likely to have extensive knowledge of the policy intervention and strong attitudes towards it. If their attitude towards the policy intervention is favourable, then they will comply with the intervention and may even advocate for it (Murdoch et al. 2006).

If people in quadrant 3 have an unfavourable attitude towards the policy intervention, then they may comply, but reluctantly (Kaine et al. 2010). Non-compliance with the intervention will be intentional. Most likely they will prefer, and even advocate for, alternative intervention designs. Where practical, incorporating alternatives into the design of the policy intervention may encourage the compliance of these people. Alternatively, offering incentives to reduce compliance costs may neutralise unfavourable reactions.

People in quadrant 4 exhibit low involvement with the policy outcome but high involvement with the intervention. People in this quadrant are likely to have limited knowledge of the policy outcome. They are likely to have detailed knowledge of the policy intervention and have strong attitudes towards it. If their attitude towards the intervention is favourable, then they will comply with the intervention (Kaine et al. 2010). On the other hand, if they have an unfavourable attitude towards the policy intervention, then they will only comply reluctantly, or may intentionally refuse to comply at all. These people will regard the intervention as imposing unwarranted costs upon them. Most likely they will agitate against the policy intervention (Kaine et al. 2010). Offering incentives to offset compliance costs may neutralise unfavourable reactions.

Case Study

Background

We used the framework proposed by Kaine et al. (2010) to measure the involvement of urban householders in Dunedin with the idea of trapping possums. The purpose of this research was to providing insights into the popularity, or otherwise, of a program promoting urban trapping for Predator Free Dunedin (PF2050 2020; PFD 2020).

Methods

A questionnaire was developed to elicit people's views on three sets of scales. The first set of scales measured their involvement with the idea of reducing possum numbers and their involvement with the idea of trapping possums. Involvement was measured using a condensed version of the Laurent and Kapferer (1985) involvement scale developed by Kaine (2019) with respondents rating statements for each of the five components of involvement as follows:

- statements about functional involvement concerning the importance of, and caring about, reducing possum numbers
- Statements about experiential involvement concerning the reward from, and passion about, reducing possum numbers.
- statement about self-identity concerning opinions about reducing possum numbers reflecting on your identity, and others identity, as a person

- statements about consequences concerning the seriousness or importance of consequences arising from making a mistake in relation to reducing possum numbers.
- statements about the risk of making mistakes concerning the complexity or difficulty of making decisions about reducing possum numbers.

Similar statements were formulated for involvement with trapping possums.

The second set of scales measured attitudes, and attitude strength, towards trapping possums. Attitudes were measured using a simple, evaluative Likert scale. The strength of respondents' attitudes to possum trapping was expected to vary depending on the strength of their involvement with trapping. Consequently, respondents were also questioned about their uncertainty, or otherwise, towards trapping using an ipsative scale or 'forced choice' based on Olsen (1999). In addition, the Pest-Management Attitude scale (Aley et al. 2020) was included in the questionnaire to obtain a measure of respondents' attitudes towards pests generally.

The third set of scales were a series of questions formulated to discover respondents' beliefs about the advantages and disadvantages of reducing possum numbers, and of trapping to achieve this. Information was sought on whether respondents trapped possums and their experiences if they did. Respondents who did not trap were asked about their reasons for not doing so. A series of questions were also included concerning respondent's age, gender, education, income, property, and location. Finally, information was collected on whether respondents were aware of, or volunteered for, Predator Free Dunedin.

The questionnaire was administered online and through telephone by a market research company. The ordering of the statements in the involvement, attitude, and belief scales was randomised among the individual questionnaires to avoid bias in responses. Participation in the survey was voluntary, respondents could leave the survey at any time, and all survey questions were optional and could be skipped.[1]

Telephone respondents were randomly selected from a database of urban addresses in Dunedin. Internet respondents were randomly selected from a database of panellists in Dunedin. Internet respondents received compensation for competing surveys and had greater flexibility with respect to when they participated. The survey was conducted in April 2020 and we received 404 responses.

Results

Approximately 54 per cent of the respondents were men. The age distribution of the sample was marginally older than current census estimates for Dunedin and had a higher level of education than current census estimates for Dunedin. The overwhelming majority of respondents lived in a house (82 per cent) with most of the remaining respondents living in apartments, townhouses or units (14 per cent). A small proportion of respondents lived on farmlets or lifestyle blocks (4 per cent) bordering the city. A complete report on our sample and our results can be found in Kaine et al. (2020).

[1] The questionnaire was approved for distribution by Manaaki Whenua – Landcare Research's social ethics process (application 1920/29).

Involvement with trapping and reducing possum numbers

Following Kaine et al. (2010) respondents were classified into two-dimensional maps based on their involvement with the idea of reducing possum numbers and their involvement with the idea trapping (see Fig. 2). Respondents were classified into quadrants based on their involvement scores relative to the scale mid-point. A score of one indicates the minimum possible level of involvement, and a score of five indicates the highest possible level of involvement. So, for example, respondents with involvement scores less than three for reducing possum numbers and using traps were classified into quadrant 1.[2]

Inspection of Figure 2 reveals that most respondents exhibited moderate to high involvement with the idea of reducing possum numbers, and mild to moderate involvement with using traps to catch possums. Consequently, most respondents were classified into quadrant 3 (see Table 1). The moderate to high involvement of respondents with reducing possum numbers indicates that most residents of Dunedin would support a policy to eradicate possums in urban areas (see Table 2). The mild to moderate levels of residents' involvement with trapping suggests that, while they would they have some interest in the idea of traps (Table 2), they would be likely to invest only a limited amount of their time and energy in trapping.

Almost 50 per cent of respondents had a strongly favourable attitude to trapping. Only 5 per cent of respondents had an unfavourable attitude towards trapping (see Table 3). Consistent with reporting only mild to moderate involvement with trapping possums, just under half of respondents were unsure about or indifferent towards trapping. As we expected, these respondents had lower levels of involvement than respondents who had a definite favourable attitude towards trapping (see Table 4).

In line with theory, a relatively high proportion of respondents who were uninterested in reducing possum numbers and uninterested in trapping (quadrant 1) had not thought about, or were indifferent to, the use of traps. In contrast, a relatively high proportion of respondents who were interested in reducing possum numbers and in trapping (quadrant 3) had a definite and favourable attitude toward trapping (see Table 5). The relatively high proportion of respondents that were interested in reducing possum numbers but had not thought about or were indifferent to the use of traps (quadrant 2) is consistent with the respondents in this quadrant exhibiting low to mild involvement with trapping possums.

Involvement profiles

The involvement profiles of respondents in each quadrant with respect to reducing possum numbers are reported in Figure 3. The profiles represent the average score, for each of the involvement statements, of the respondents in each quadrant. On average, respondents exhibited higher involvement with the idea of reducing numbers of possums than with the idea of using traps to catch possums.

On average, respondents in quadrants 2 and 3 exhibit moderate functional, experiential, and identity involvement with the idea of reducing possum numbers. This implies that, to the degree these respondents were involved with the idea of reducing possum numbers, their involvement stems from concerns about the potentially unfavourable impact possums can

[2] Statistical tests (Carmines and Zeller, 1979) indicated that the scales were reliable, that is, internally consistent in the sense that scores on related statements were highly correlated with each other.

Figure 2. I_3 mapping of involvement with the idea of reducing possum numbers and the idea of using traps.

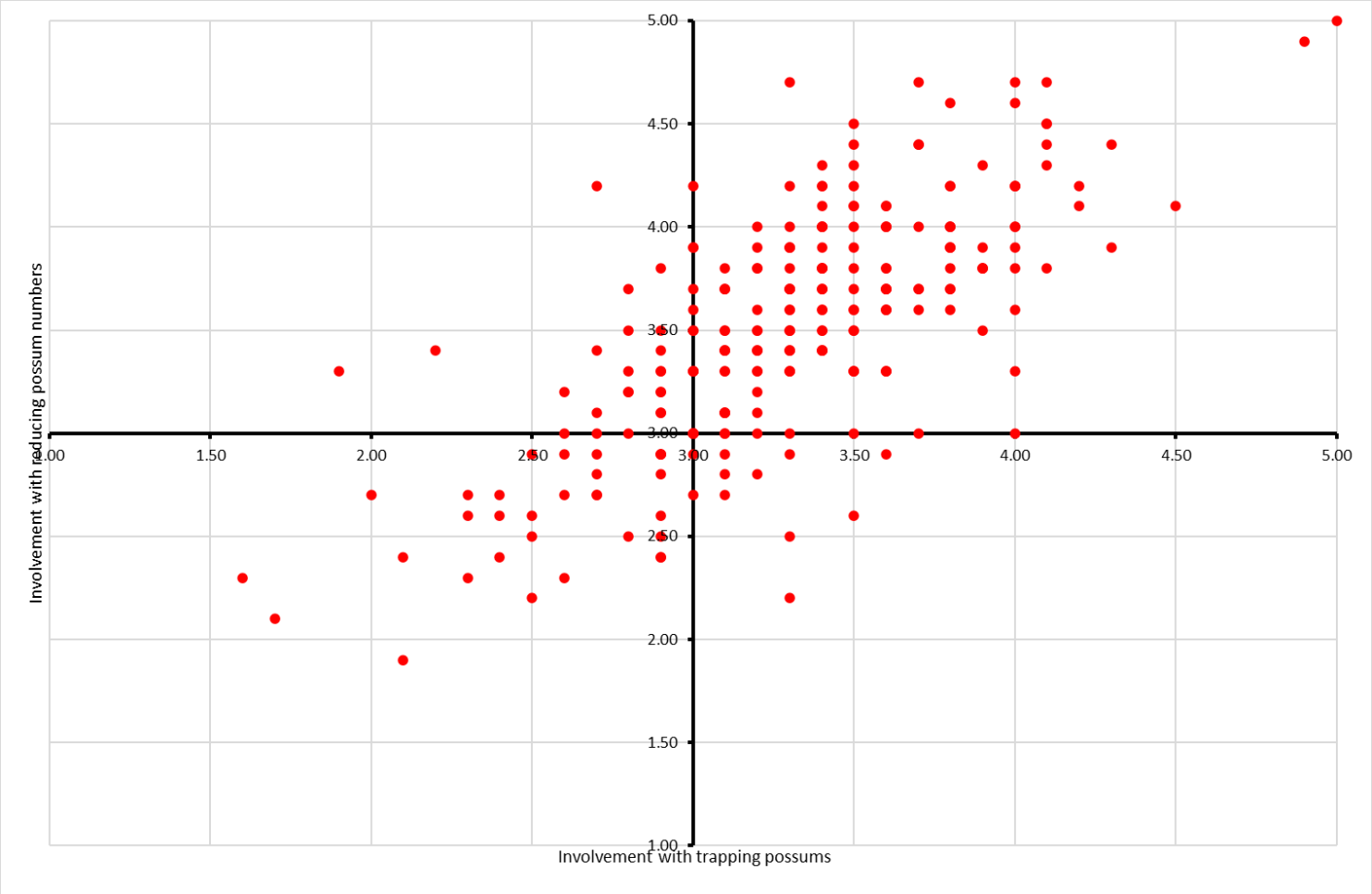


Table 1. I_3 classification

Quadrant	Proportion of sample %
One – indifferent	11.1
Two – involved with reducing possum numbers	11.4
Three – involved with reducing possum numbers and with using traps	74.0
Four – involved with using traps	3.5

Table 2. Mean involvement by I_3 quadrant

	Involvement with reducing possum numbers[1]	Involvement with using traps to reduce possum numbers[2]
Quadrant 1	2.54	2.49
Quadrant 2	3.43	2.65
Quadrant 3	3.78	3.54
Quadrant 4	2.72	3.22

Notes: [1] Test for difference in means across quadrants ($F=131.5$, $p<0.01$)
[2] Test for difference in means across quadrants ($F=152.6$, $p<0.01$)

Table 3. Attitude towards trapping possums

Attitude	Proportion of sample %
Right thing to do	48.8
Doesn't matter to me	13.1
Not sure	15.6
Haven't given it much thought	17.1
Bad thing to do	5.4

Table 4. Involvement and attitude towards trapping possums

Attitude	Involvement with reducing possum numbers[1]	Involvement with using traps to reduce possum numbers[2]
Right thing to do	3.82	3.53
Doesn't matter to me	3.33	3.08
Not sure	3.40	3.19
Haven't given it much thought	3.26	3.06
Bad thing to do	3.27	3.02

Notes: [1] Test for difference in means across attitude categories ($F=21.4$, $p<0.01$)
[2] Test for difference in means across attitude categories ($F=18.8$, $p<0.01$)

Table 5. I_3 classification and attitude towards trapping possums

Attitude	Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4
Right thing to do	13.3	21.7	59.5	21.4
Doesn't matter to me	31.3	21.7	8.4	28.6
Not sure	17.8	17.4	15.1	14.3
Haven't given it much thought	24.4	28.3	14.0	21.4
Bad thing to do	13.3	10.9	3.0	14.3

Note: Values are proportion of respondents in each quadrant. Test for differences in proportions across quadrants ($\chi^2=68.9$, $p<0.01$)

Figure 3. Involvement profiles for the idea of reducing possum numbers**.**
Note: Scale statements concerned the importance of (functional 1) and caring about (functional 2) reducing possum numbers; the reward from (experiential 1) and passion about (experiential 2) reducing possum numbers; opinion about reducing possum numbers reflecting on you (identity 1) and others (identity 2) as a person; the seriousness (consequence 1) or importance (consequence 2) of consequences arising from making a mistake in relation to reducing possum numbers; and the complexity (risk 1) or difficulty (risk 2) of making decisions about reducing possum numbers. Complete statements are available on request from the authors.

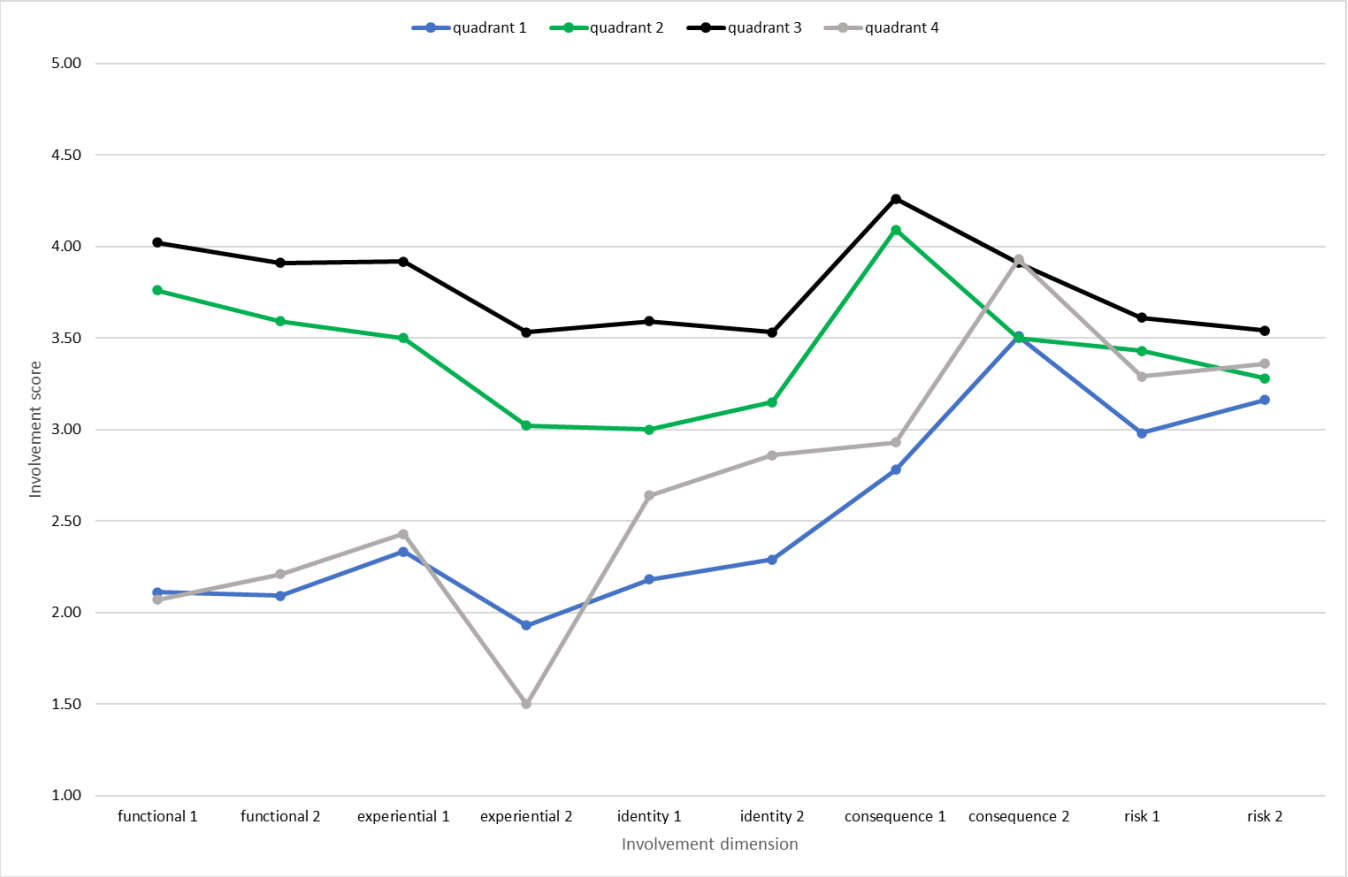
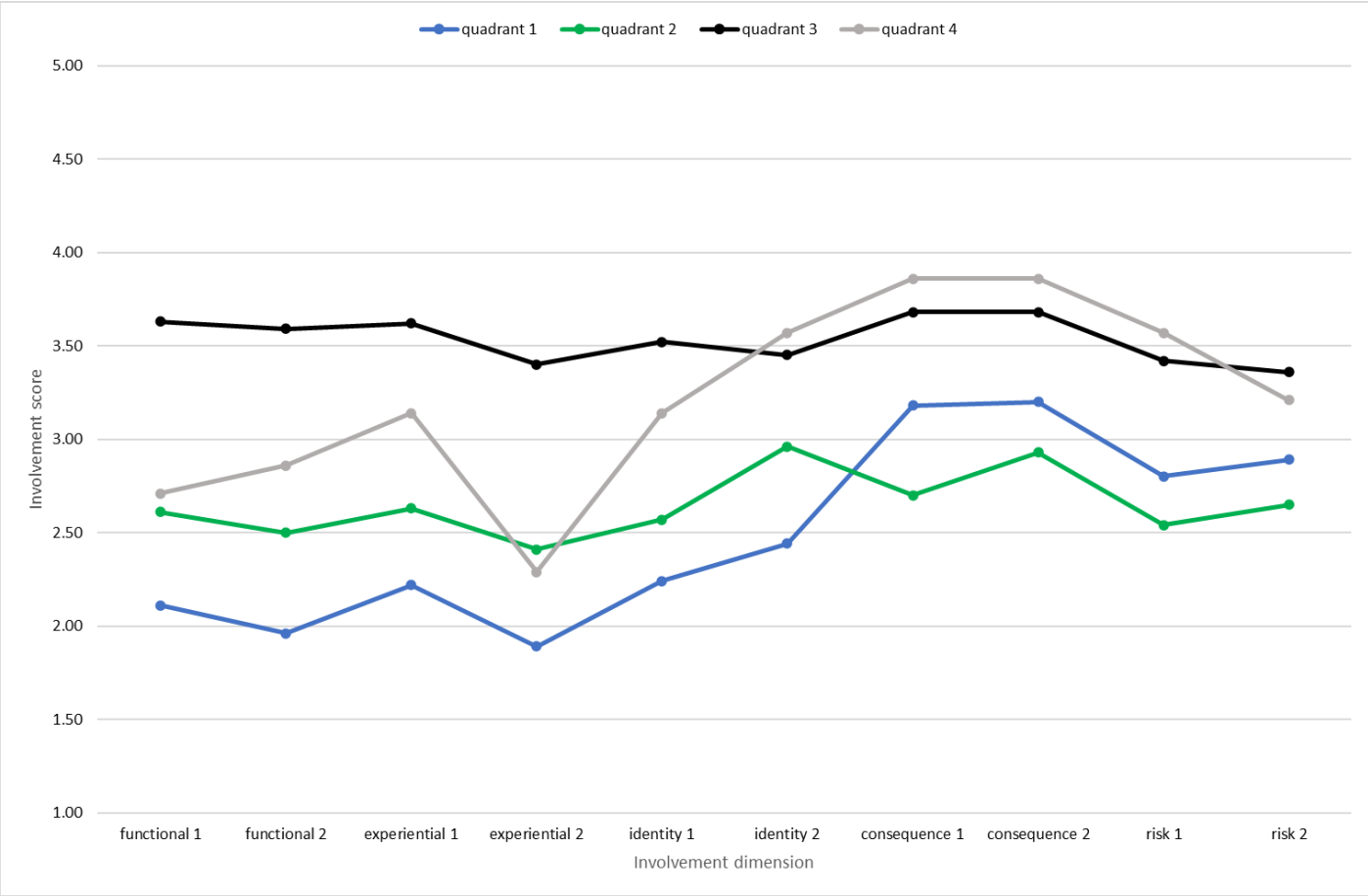


Figure 4. Involvement profiles for the idea of using traps to reduce possum numbers.
Note: Scale statements concerned the importance of (functional 1) and caring about (functional 2) using traps; the reward from (experiential 1) and passion about (experiential 2) using traps; opinion about using traps reflecting on you (identity 1) and others (identity 2) as a person; the seriousness (consequence 1) or importance (consequence 2) of consequences arising from making a mistake in relation to using traps; and the complexity (risk 1) or difficulty (risk 2) of making decisions about using traps. Complete statements are available on request from the authors.



have on their material well-being and enjoyment. These concerns could stem from the perceived impact of possums on biodiversity and the environment, as well as the risks they pose to human health and the damage they can inflict on buildings, gardens, and so forth. Respondents in quadrants 1 and 4 exhibited mild involvement on these dimensions. Respondents in all quadrants exhibited moderate consequence and risk involvement suggesting they believe there is some risk that mistakes could be made with reducing possum numbers, and any such mistakes could have serious consequences.

The involvement profiles of respondents in each quadrant with respect to using traps to reduce possum numbers are reported in Figure 4. Again, the profiles represent the average score, for each of the involvement statements, of the respondents in each quadrant. On average, with respect to the idea of using traps to reduce possum numbers, respondents in quadrant 3 exhibited moderate involvement across all the components of involvement.

Respondents in quadrant 4 exhibited mild involvement with most aspects of trapping possums but moderate consequence and risk involvement, suggesting they may be concerned about the consequences of making mistakes when trapping possums. Respondents in quadrants 1 and 2 primarily exhibit mild involvement with all aspects of the idea of using traps to reduce possum numbers.

Involvement with the idea of reducing possum numbers and involvement with the idea of using traps to reduce possum numbers was not related to the gender, education, income, or property type of respondents. There was a statistically significant, but inconsequential, association between age and involvement with the idea of reducing possum numbers, with older respondents exhibiting marginally higher involvement than younger respondents. There was no association between age and involvement with the idea of using traps to reduce possum numbers.

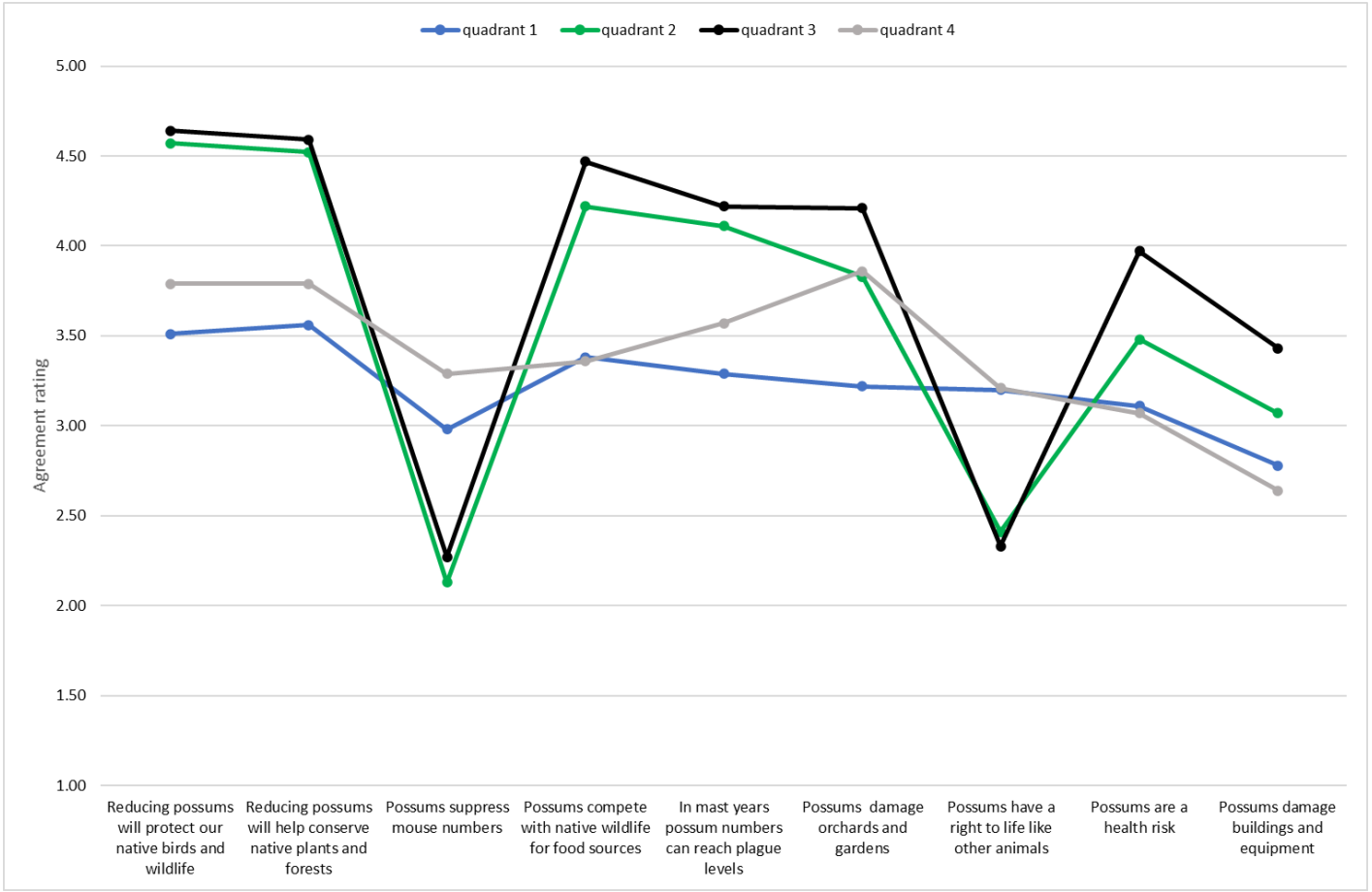
Involvement and beliefs about possums

Respondents in quadrants 2 and 3, representing 85 per cent of the sample, believe possum populations should be reduced to protect and conserve native birds and wildlife, as well as native plants and forests. They also believe possums damage orchards and gardens as well as buildings and equipment, and that they are a risk to health (see Fig. 5). They disagreed, on average, with the view that possums are as entitled to life as other animals.

We expected differences across the quadrants in respondents' opinions about possums. Specifically, we hypothesised, because of their relatively low involvement with the idea of reducing possum numbers, that respondents in quadrant 1 would be less likely than respondents in other quadrants to express definite opinions about the unfavourable effects of possums on native plants, birds and animals, and on orchards, gardens, buildings and equipment.

This hypothesis was supported with respondents in quadrant 1 being less sure, on average, about the unfavourable effects of possums than respondents in quadrants 2 and 3 (see Fig. 5). On average, the opinions of respondents in quadrant 4, who also have relatively low involvement with the idea of reducing possum numbers, were like those of respondents in quadrant 1.

Figure 5. Respondents' beliefs about the advantages and disadvantages of reducing possum numbers.



Involvement and attitudes about using traps

The interaction between involvement and attitudes determines the types of strategies that may be employed to change the behaviour of people in each quadrant of the framework (Kaine et al. 2010). Consequently, both the direction and strength of respondents' attitudes towards trapping possums were measured with a four-statement normative scale about trapping and a five-statement ipsative scale about trapping, respectively. Testing revealed respondents' answers were consistent across the two scales, with respondents who indicated trapping was the 'right thing to do' on the ipsative scale displaying the most favourable scores, on average, on the normative scale. Correspondingly, respondents who indicated trapping was a 'bad thing to do' displayed the least favourable scores, on average, on the normative scale (see Table 6). Responses were also satisfactorily consistent with respect to attitudes towards pests generally and attitudes towards trapping possums with the two measures being reasonably correlated (see Table 7).

On average, respondents in quadrant 1 were unsure about, or had a neutral attitude, towards trapping. Respondents in the other quadrants expressed a favourable attitude towards trapping, with respondents in quadrant three having the most favourable attitude (see Table 7). Respondents' beliefs about the advantages and disadvantages of using traps to reduce possum numbers were broadly similar, on average, across the quadrants. However, respondents in quadrants 2 and 3 were less likely than respondents in quadrants 1 and 4 to believe that trapping was a danger to children, pets or native birds, a risk to health or inhumane, and more likely to agree that traps were more effective than baiting.

Overall, these results imply that there is widespread support for using traps to reduce possum numbers in Dunedin. This is consistent with experience of community attitudes to predator control in Wellington (PFW 2019a).

Involvement and possum trapping activity

We expected differences across the quadrants in the degree to which respondents agreed they were personally responsible for reducing possum numbers. Consistent with differences in their involvement with the idea of reducing possum numbers, respondents in quadrants 2 and 3 expressed stronger agreement than respondents in quadrants 1 and 4, that reducing possum numbers was the right thing to do, that reducing possum numbers was their responsibility and that they were willing to take action and make sacrifices to reduce possum numbers (See Fig. 6). We also hypothesised respondents who had higher involvement with the ideas of reducing possum numbers and with trapping (quadrant 3) would be more likely to actually trap possums than respondents who are less involved with these ideas (quadrants1, 2 and 4). This hypothesis was supported (see Table 8). These results indicate that differences in motivation, as measured by involvement, are an important factor influencing trapping.

With one exception, there were no significant differences between respondents who were and were not trapping in their perceptions of the advantages and disadvantages of reducing possum numbers. The exception was with respect to the need to keep possums to suppress mice with those that were trapping possums being less likely to agree that possums were needed to suppress mice.

Table 6. Consistency in attitudes towards trapping possums

Attitude statements (ipsative scale)	Attitude towards trapping possums (normative scale)[1]	Attitude towards pests (normative scale)[2,3]
Right thing to do	4.42	3.76
Doesn't matter to me	3.75	3.55
Not sure	324	3.51
Haven't given it much thought	3.52	3.50
Bad thing to do	1.82	3.10

Note: Values are mean scores of respondents on the normative scale for each ipsative attitude category

[1] Test for differences in means across attitude categories ($F=121.1$, $p<0.01$)

[2] Test for differences in means across attitude categories ($F=10.7$, $p<0.01$)

[3] Pest-Management Attitude scale (Aley et al. 2020)

Table 7. I_3 classification and attitudes towards trapping possums

	Attitude towards trapping[1]	Attitude towards pests[2,3]
Quadrant 1	3.07	3.21
Quadrant 2	3.54	3.72
Quadrant 3	4.05	3.69
Quadrant 4	3.32	3.06

Note: [1] Test for differences in in means across quadrants ($F=21.6$, $p<0.01$)

[2] Test for differences in means across quadrants ($F=16.4$, $p<0.01$)

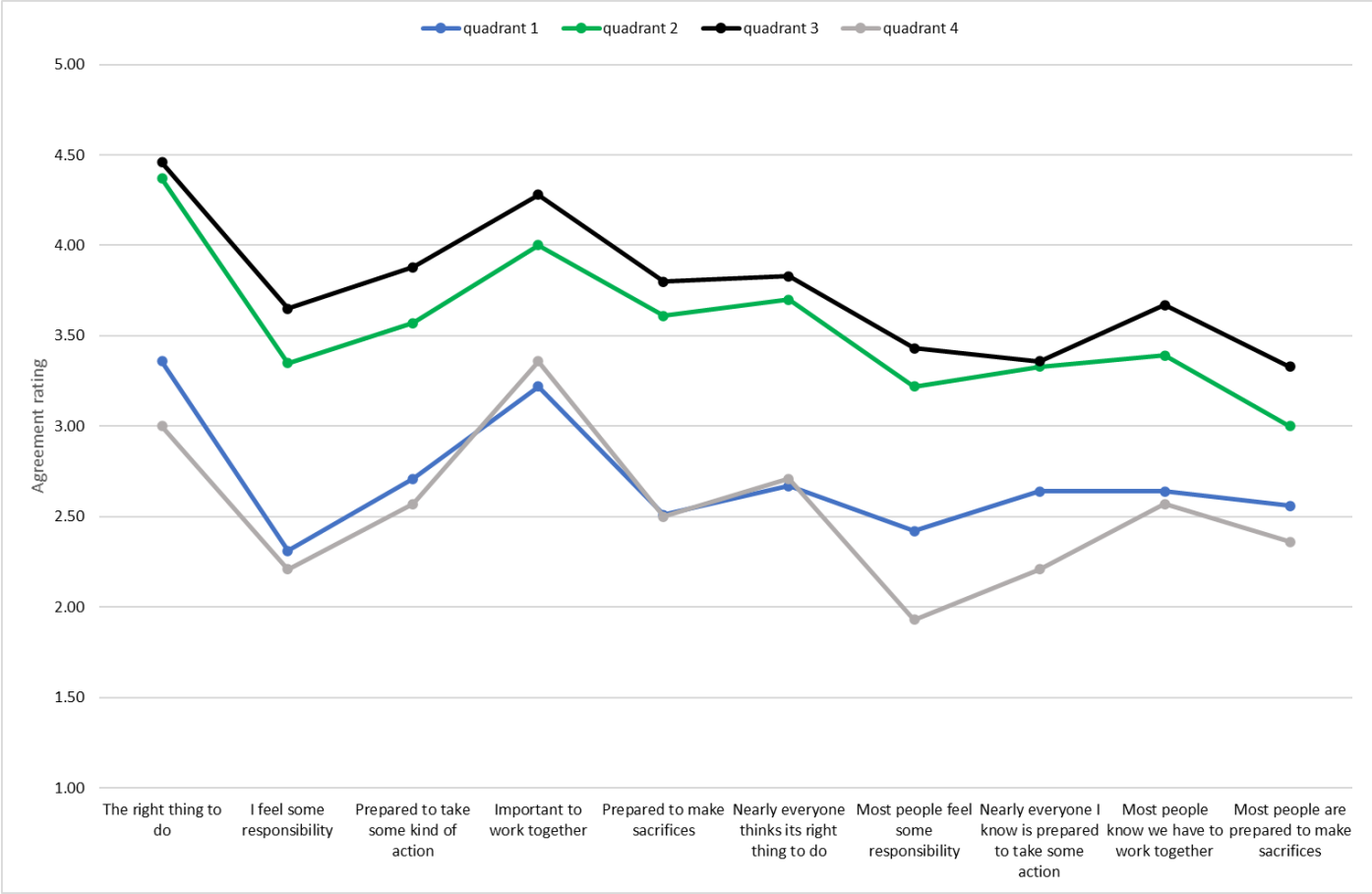
[3] Pest-Management Attitude scale (Aley et al. 2020)

Table 8. I_3 classification and proportion of respondents that currently trap possums[1]

	Proportion of quadrant %
Quadrant 1	2.2
Quadrant 2	2.2
Quadrant 3	13.4
Quadrant 4	0.0

Note: [1]Test for differences in proportions across quadrants ($\chi^2=11.0$, $p=0.01$)

Figure 6. Respondents' beliefs about responsibility for reducing possum numbers.



Respondents who were trapping possums differed in their beliefs about the advantages and disadvantages of trapping from those who did not. Basically, those who were currently trapping had more favourable opinions of the cost effectiveness, safety, and humaneness of trapping than those who were not. The latter were, on average, less certain about these qualities.

The proportion of respondents in each quadrant who were in favour of, unsure about, or against trapping possums is summarised in Figure 7. The two largest groups of respondents in our sample were the respondents in quadrant 3 who either favoured, or were unsure about, trapping. Comparing these two groups confirms the importance that both involvement and attitude have on the propensity to trap. Approximately 19 per cent of respondents in quadrant 3 who favoured trapping, reported they trapped possums. In contrast only 5 per cent of respondents in quadrant 3 who were unsure about trapping, reported they trapped possums.

Compared to respondents in quadrant 3 who favoured trapping, the respondents in this quadrant who were unsure about trapping were:

- not as certain of the importance of reducing possum numbers and thought there was a greater chance of mistakes being made in trying to reduce possum numbers
- not as sure of the importance of using traps to reduce possum numbers and thought there was a greater chance of mistakes being made in using traps to reduce possum numbers, and
- less sure of the advantages of trapping, and less confident about the safety and welfare aspects of trapping.

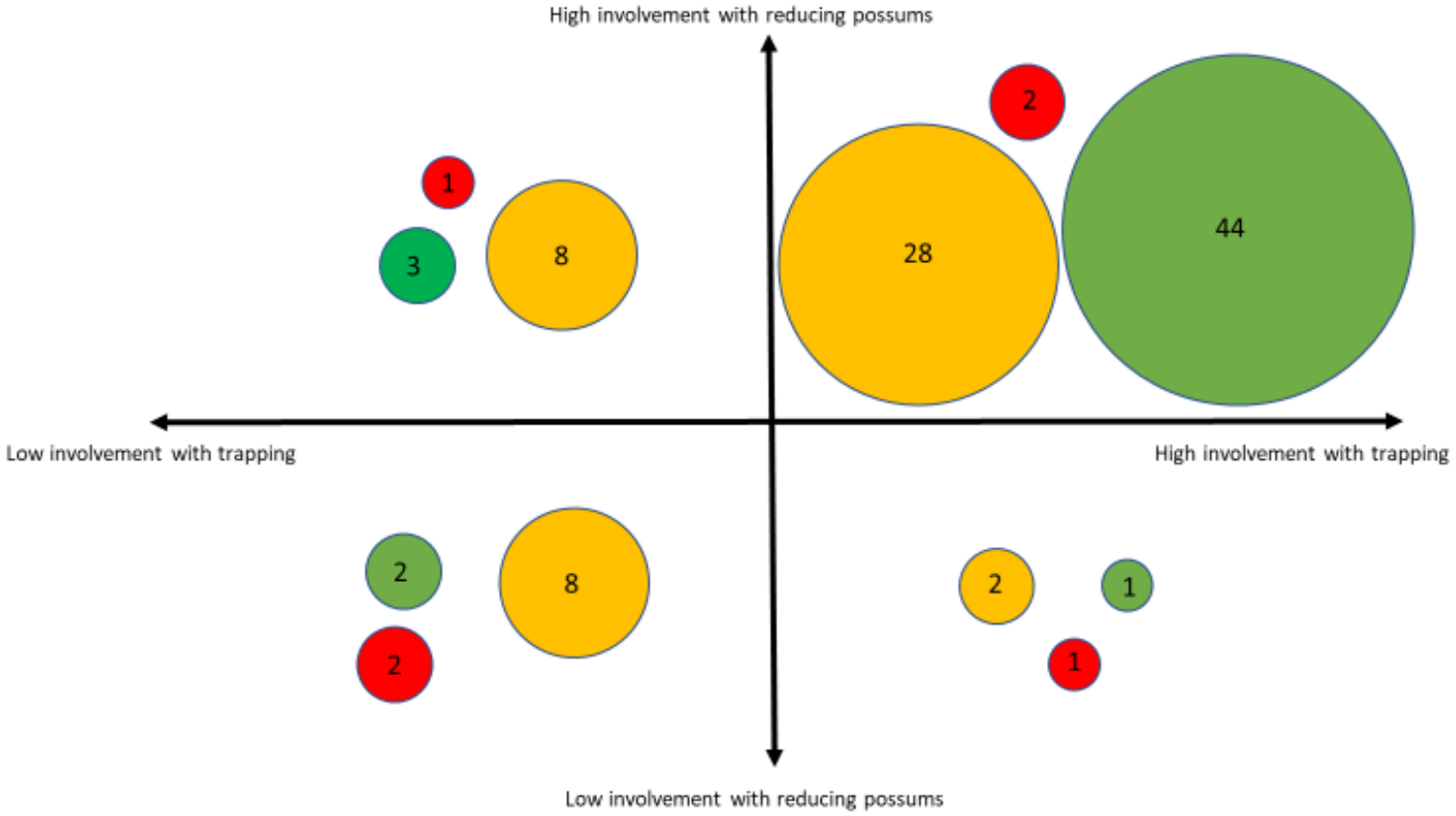
These results indicate that the propensity to trap is influenced by a person's involvement with the idea of reducing possum numbers and with the idea of trapping. Beliefs about the advantages and disadvantages of reducing numbers of possums appear to have little influence on the propensity to trap; however, beliefs about the advantages of trapping did have an important influence on whether respondents trapped possums.

Discussion

Kaine et al. (2010) hypothesised that the propensity of people to change their behaviour and comply with a policy intervention depends first, on the intensity of their involvement with the intervention and second, on their attitude towards the intervention. This is because cognitive effort is required to form a strongly held attitude and such effort is only invested when the matter at hand is sufficiently important to the individual. They also hypothesised that the propensity of people to comply with an intervention depends on the interaction between their involvement with the policy issue that the intervention addresses, and their involvement and possible attitude towards the intervention itself. Our results support these hypotheses.

The results confirmed there was a strong association between respondents' propensity to trap possums and their involvement with the idea of reducing possum numbers and using traps, and their attitude towards trapping. This means residents' willingness to trap possums is not just matter of their attitude towards trapping but also depends on how strongly motivated they are to reduce possum numbers.

Figure 7. Graphical summary of respondents' involvement with the idea of reducing possum numbers and their involvement with, and attitudes towards, the idea of using traps.
Note: Green indicates favourable, yellow indicates unsure, and red indicates unfavourable attitude to trapping possums. Values are percentage of sample and the size of circles is proportional to the relevant percentage of the sample.



Our results have several implications for designing strategies to encourage acceptance of, and participation in, a programme to control possums in Dunedin. Most respondents exhibited moderate involvement with reducing possum numbers and mild to moderate involvement with using traps. Most respondents also exhibited favourable attitudes towards reducing possums and using traps. These results indicate there is widespread support among residents of Dunedin for reducing possum numbers in the city and for using traps. This means many households in Dunedin would participate in an urban programme for trapping possums, either by installing and managing traps themselves or by permitting the installation of traps on their properties which could be serviced by programme volunteers. Given most respondents exhibited only mild to moderate involvement with trapping, participation in the programme should be made as simple and easy as possible.

Knowing the primary reasons why residents want to reduce possum numbers provides a foundation for influencing their willingness to participate in a possum trapping programme. Our findings suggest residents' desire to reduce possums in Dunedin is primarily motivated by concerns for biodiversity and the environment, the health of themselves and their families, and the potential for possums to damage property, gardens, and equipment. Consequently, to promote trapping and participation in a trapping programme we suggest attempts to encourage participation should concentrate on promoting the potential of urban trapping to reduce these harms.

A substantial proportion of respondents, nearly 30%, were moderately involved in the idea of reducing possums and with the idea of trapping but were unsure of their attitude towards trapping. These respondents were less convinced of the benefits of trapping and were uncertain about the safety and welfare aspects of traps. Their moderate involvement with the idea of reducing possum numbers and with the idea of trapping indicates these respondents will be attentive to promotional information about trapping. Consequently, to encourage trapping and participation in a trapping programme among this group we suggest promotional efforts should emphasise the safety of traps, and the speed and efficacy with which they function.

Finally, the results indicated that respondents who did not trap were simply less interested in the problem of possums and in trapping, compared to those that did. Although those that did not trap were aware of the advantages of reducing possum numbers, they were simply less enthusiastic about the benefits they might experience from trapping than those that did trap. This supports our conclusion that most householders who do not trap would support (or at least not oppose) an urban trapping programme; and that many of these householders would participate in such a programme, provided participation was inexpensive and required little effort on their part (for example, traps were supplied and delivered to households for free). This is consistent with experience in predator control in Wellington (PFW 2019b).

Conclusion

The framework proposed by Kaine et al. (2010) provides a systematic basis for government agencies to develop a mix of strategies that target relevant differences in the propensity of people to change their behaviour in response to a policy intervention.

Theoretically, and by application in a case study, we have shown the framework has merit in predicting the behavioural responses of people to an intervention, and that the framework can be employed to help identify strategies to enhance compliance with an intervention beyond simple enforcement and promotion. Hence, the framework may provide a basis for targeting policy resources, thereby reducing the risk of over-investing in activities that are likely to have little impact on compliance or under-investing in alternative strategies that can strongly improve compliance.

The results also give clues to how urban centres throughout New Zealand can design their pest control policies. Policies should be designed that target urban residents desire to increase biodiversity in their neighbourhood. Additionally, urban residents may need to be more familiar with the safety and effectiveness of trapping to make them comfortable with having traps on their properties.

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