2020

A Quantitative Exploration of Conflict Potential and Perceptions of Threats, Benefits and Barriers: Toward Conflict Prevention When Dogs Visit Nature Trails

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A Quantitative Exploration of Conflict Potential and Perceptions of Threats, Benefits and Barriers: Toward Conflict Prevention When Dogs Visit Nature Trails

by

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A Dissertation Presented to the
College of Arts, Humanities, and Social Sciences of Nova Southeastern University
in Partial Fulfillment of the Requirements for the Degree of
Doctor of Philosophy

Nova Southeastern University
2020

Nova Southeastern University
College of Arts, Humanities, and Social Sciences

This dissertation was submitted by Jane Marie Szostak Walsh under the direction of the chair of the dissertation committee listed below. It was submitted to the College of Arts, Humanities, and Social Sciences and approved in partial fulfillment for the degree of Doctor of Philosophy in Conflict Analysis and Resolution at Nova Southeastern University.

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Dedication

For my husband, EJ, who understood, perhaps better than I, that it had to be done. And for anyone who has set aside aspirations, may this serve as testimony that it might not be too late to revisit them.

Acknowledgments

To Dr. Urszula Strawinska-Zanko, whose support as chair of my dissertation committee enabled me to conduct a study that embraced both my environmental and conflict resolution interests, I say thank you. Always enthusiastic and thoughtful, your guidance was much appreciated. To my dissertation committee members, Dr. Elena Bastidas and Dr. Robin Cooper, I say thank you for your critical eye and helpful feedback. To the faculty in the Department of Conflict Resolution Studies, thank you; I am a changed person for having participated in your courses and the program, just as Sharon McIntyre, then PhD candidate, promised would happen when we met during registration at my first Residential Institute in Fall 2014. I am grateful to Lisa Vernegaard, Executive Director at Sudbury Valley Trustees (SVT) who brought to my attention the varied conflicts that arise when dogs are welcomed to natural settings; and to Marci DuPraw, Ph.D. faculty adviser for my practicum with SVT. For helping in ways large or small, I thank Kathy Joubert, Northborough Town Planner; Northborough Trails Committee; James Robbins, Westborough Town Planner; and Westborough Community Land Trust. To my research assistants, Sarah Michaud and Kaleigh Wright, I thank you for your help with recruitment, especially at the trailheads. To participants in the pilot study and to those in the study proper, thank you for your willingness to share your perceptions for research purposes. To friends and family who talked ‘dog poop’ with me, I thank you for your interest and patience. To Elaine Solomon thank you for the intellectual and emotional support I received from you, especially during the proposal stage. And to my dissertation buddies and program colleagues, Melinda Burrell and Kathy Watkins-Richardson, I offer an abundance of gratitude for sharing the journey.

Table of Contents

List of Tables

List of Figures

Abstract

The managers of natural settings, that welcome visitors with dogs, often post regulations requiring dog waste to be collected and dogs to be leashed, but noncompliant behavior persists. Using an outdoor-recreation conflict model (ORCM) dog-walking practices were positioned as potential sources of conflict. The overarching purpose of this study was to explore the utility of pairing the ORCM with an expectancy decision-making model (the health belief model, HBM) when developing a persuasive message to promote the collection of dog waste. As a cross-sectional, descriptive, online survey, responses from 284 trail visitors who walk with a dog were used to test for relationship between self-reported dog-walking practices and respectively perceptions of antecedent conflict factors, conflict potential and/or HBM factors. Some antecedent conflict factors were related to dog-walking behaviors. Conflict potential related to dog-waste collection and to attachment, visit frequency and tolerance. The usefulness of applying the HBM to promote dog-waste collection was questioned because only one HBM factor related to dog-waste collection. By using ORCM factors as stratifying variables, the significant relationship between HBM barrier and dog-waste collection was attributed to specific levels of visit frequency, tolerance for human-dog interactions, and conflict potential. Strength of relationships were typically weak. For land-managers, these findings suggest that visitors who walk with a dog may be more varied than one might assume of a same-activity group; and they justify further exploration of perceptions of conflict potential rooted in human-dog interactions for the purpose of fostering positive experiences and resource preservation in shared natural settings.

Chapter 1: Introduction to the Study

Public spaces are often managed with competing goals in mind. A longstanding example of such competition is that of dueling land management goals: fostering resource protection while simultaneously preserving positive visitor experiences to those natural resources (Manning, 2011; Watson, Cordell, Manning, & Martin, 2016). When companion dogs are among the visitors, the management challenge is typically greater because of the additional potential for negative impacts to both the natural and social environments (e.g., Vaske & Donnelly, 2007; Weston et al., 2014). Despite regulations and policies intended to minimize the negative impacts of visitors to natural settings, noncompliant dog walking behaviors persist (Blenderman, Taff, Schwartz, & Lawhon, 2018; Bowes, Keller, Rollins, & Gifford, 2018).

Dogs off leash and uncollected dog waste both serve as potential sources of conflict in that they may interfere with the goals of land managers and they may interfere with the visit goals of other visitors (e.g., Atenstaedt & Jones, 2011; Bowes, Keller, Rollins, & Gifford, 2017; Kellner et al., 2017; Vaske & Donnelly, 2007; Verlic, Arnberger, Japelj, Simoncic, & Pirnat, 2015). Left unattended, noncompliance can result in escalated management responses as was seen in 2017 when a coastal New Hampshire town announced fines of up to $1,000 for leaving dog waste uncollected in public (Carosa, 2017) and again as seen in the summer of 2018, when it was reported that "City officials are stepping up pressure on dog owners to clean up their pets' waste after bags of excrement were found strewn around conservation parcels — hanging from trees, flowing out of drainage pipes and stuffed into donation boxes" (Haddadin, 2018, para.1).

This chapter provides background on the research problem (i.e., behavior that does not comply with established policy and thus harbors conflict potential), articulates the significance of studying the problem, touches on theoretical underpinnings, describes the purpose of the research study, poses the research questions, and provides definitions of terms. Finally, an overall outline of the manuscript is offered.

Background

Conserving land and preserving opportunities for humans to be in natural settings is important for the health of both (Carter & Horwitz, 2014; Clayton & Saunders, 2012; Russell et al., 2013; Thomsen, Powell, & Monz, 2018). Outdoor recreation on undeveloped land, however, inherently competes with goals of conservation and land stewardship (Flather & Cordell, 1995; Manning, 2007; Watson et al., 2016). Recreational uses are as valid as conservation uses as reflected in the mandates of the United States 1964 Wilderness Act in which land uses in wilderness areas were defined as serving "… the public purposes of recreational, scenic, scientific, educational, conservation, and historical use" ("Wilderness Act," 1964, Section 1133 (b)).Competing management goals exist whether in the wilderness of backcountry or on the tamed suburban walking trail. Addressing both sets of goals in balanced fashion is among driving forces in land management (e.g., Greer, Day, & McCutcheon, 2017; Y.-F. Leung & Marion, 2000).

When recreationists are accompanied by their pet dogs, additional management challenges surface because there is potential for dogs to also harm natural resources and/or the social environment (e.g., Arnberger & Eder, 2012; Gaunt & Carr, 2011; Kellner et al., 2017; Reed & Merenlender, 2011; Stigner, Beyer, Klein, & Fuller, 2016; Typhina & Yan, 2014; Wells, 2006; Weston et al., 2014). Examples of typical

noncomplying behavior include dog waste left on the ground and dogs off leash when a leash requirement was in effect (e.g., Rock, Graham, Massolo, & McCormack, 2016), dogs disturbing wildlife (e.g., Bowes et al., 2018; Stigner et al., 2016), and dogs approaching visitors or other dogs uninvited (e.g., Bowes et al., 2018; Vaske & Donnelly, 2007). Such noncompliance can interfere with conservation goals and/or with visitors' goals for their outdoor experiences and in this way the noncompliance offers an example of a potential source of outdoor recreation conflict. Methods that ensure or enhance policy compliance can serve a conflict prevention function in outdoor recreation where conflict is often understood "… as goal interference attributed to another's behavior" (Jacob & Schreyer, 1980, p. 369). Conflict so defined is consistent with definitions provided by conflict generalists (e.g., Hocker & Wilmot, 2014; Pruitt & Kim, 2004; Schellenberg, 1996).

Modeling Conflict in Outdoor Recreation

Conflict in outdoor recreation is often characterized as the result of not having visit goals met because of the actions of someone else (goal interference) (Jacob & Schreyer, 1980). Conflict may thus be a consequence of direct interaction with visitors or with the effects of their behavior (labelled as either interpersonal or goal interference conflict); however outdoor recreation conflict may also reflect differences in belief about who should be able to use the land and how (this has been labelled as social values conflict) (Vaske, Donnelly, Wittman, & Laidlaw, 1995; Vaske, Needham, & Cline, 2007).

As illustrated in Figure 1, Manning (2011) synthesized the work of several to articulate an expanded outdoor recreation conflict model (herein, this model is referred to

as ORCM) that recognized both: conflict as the result of goal interference and conflict as the result of difference in social values, norms or beliefs. The model recognizes conflict between various stakeholders, but a research focus on inter-activity users has dominated the field (e.g., Gage, 2015; Graefe & Thapa, 2004; Manning, 2011).

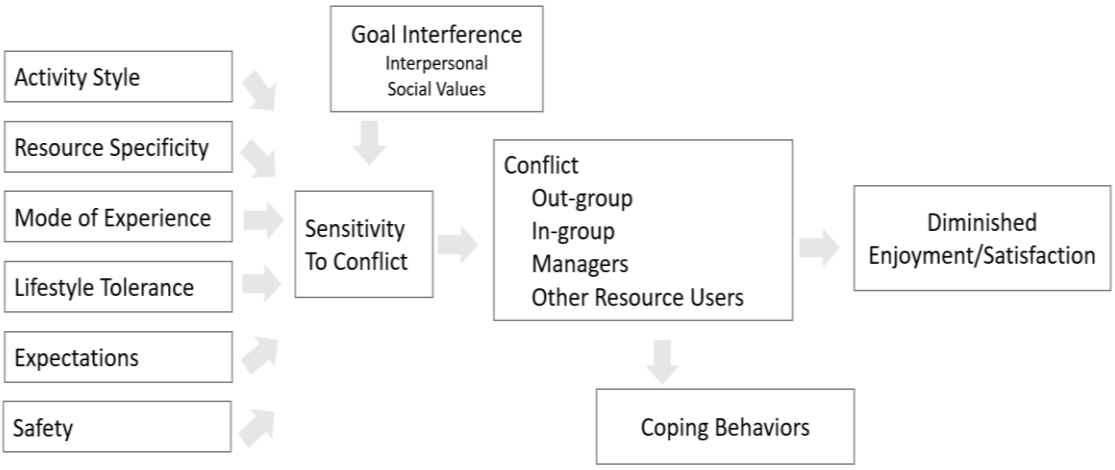


Figure 1. An expanded model for outdoor recreation conflict (Manning, 2011, pg.216).

Influenced by antecedent conflict factors, sensitivity to conflict is depicted as related to, though separate from, the experience of conflict as goal interference and possibly resulting in coping behavior (e.g., rationalizing or displacement) and/or diminished visitor experience.

Listed on the left, in Figure 1, are factors that identify influential preconditions or antecedent factors for conflict. The first four were originally proposed by Jacob & Schreyer (1980) as those factors that reflected the significance an individual gave to a particular activity (activity style); gave to matching a particular outdoor location with a particular recreational activity (resource specificity); gave to focusing on the natural setting versus other aspects of their outdoor experience (mode of experience); and gave to accepting interaction with others different from themselves (lifestyle tolerance).

Subsequent research by others indicated that expectations (Ivy, Stewart, & Lue, 1992; Mann & Absher, 2008) and safety (e.g., Blahna, Smith, & Anderson, 1995; Vaske, Carothers, Donnelly, & Baird, 2000) also impacted conflict experiences. Meanwhile, in a different but related vein, research (e.g., Mann & Absher, 2008; Ramthun, 1995; Watson et al, 1993; Watson et al, 1994) supported the suggestion that those antecedent conflict factors actually "determine sensitivity to conflict rather than conflict as it is experienced…" (Manning, 2011, p. 216). The model accounts for conflict impacts on visit experience and accounts for the use of coping strategies in response to the conflict experience. By incorporating visitor response in the guise of coping strategies, conflict as a process rather than a static outcome was underscored (I. E. Schneider, 2000b; I. E. Schneider & Hammitt, 1995).

Dog Walking as a Source of Conflict

When considering noncomplying dog walking behavior as a potential source of conflict, it can be considered within the frame of the ORCM (see Figure 1) as follows: antecedent conflict factors may influence the reasons for why local nature trail visitors with dogs choose where they walk with their dogs – perhaps the decision is based on one or more of the following: the particular attributes of or associations with a trail which make it a special place for them (resource specificity) or they may choose it because they expect to meet lots of other dog walkers like themselves (lifestyle tolerance and expectations) or they choose it because it allows them to walk in a manner with their dog the way they desire, for examples off-leash without penalty or as a proud responsible pet owner (activity style) or they may choose it because of their appreciation of the natural landscape of that trail (mode of experience). In theory, where their preferences lie will

influence how sensitive they are to behaviors that may cause conflict by interfering with their visit goals or their beliefs about how those trails should be used.

By way of example, perhaps a dog walker who leashes and cleans up after their dog is bothered by dogs running freely and by uncollected dog waste (a reflection of lifestyle tolerance); if perceived as interfering with their visit objectives, then goal interference conflict is said to have occurred. In other instances, some visitors may not enjoy their visit as much as they could have, simply by knowing that dogs are welcomed on the trail, regardless of whether they actually encounter any dogs or evidence of past dog presence; such conflict would be considered values based conflict. Responding to either type of conflict may involve coping: the visitor who thinks dogs should not be allowed, might reconsider it, in the moment, to deal with the cognitive dissonance and deem it not a problem during a trail visit with no dog encounters; alternatively a dog walker who is accompanied by a timid pet may choose to avoid particular trails to avoid their timid dog being approached, uninvited, by other dogs. By understanding dog walking behavior within the ORCM framework, it is reasonable to consider antecedent conflict factors when developing strategies to enhance policy compliance as a conflict prevention strategy.

Antecedent conflict factors applied to dog walkers. Existing research provided insight into how behaviors and beliefs of those who walk with dogs could be categorized among the antecedent conflict factors used in the ORCM. First, it is worth noting that, "… dog walking can never be the same experience as walking unaccompanied by a dog … [and] …pet dogs do not mean the same thing to everyone" (Degeling & Rock, 2012).

Activity style. Several studies have shown that some dog walkers feel an obligation or responsibility to care for their dogs through ensuring opportunities for their dogs to exercise (Cutt, Giles-Corti, Wood, Knuiman, & Burke, 2008; Degeling & Rock, 2012; Edwards & Knight, 2006; Westgarth, Christley, & Christian, 2014; K. J. H. Williams, Weston, Henry, & Maguire, 2009). Perhaps then, the antecedent conflict factor of activity style, understood as the motivation for the trail visit, is more for the dog's benefit than it is for the dog walker's benefit.

Resource specificity. The antecedent conflict factor of resource specificity may be influential because research has described how dog walkers look for certain things in the places where they bring their dogs (Cutt et al., 2008; Degeling & Rock, 2012; Edwards & Knight, 2006; Lee, Shepley, & Huang, 2009). Such place attributes may include easy access to waste cleanup supplies such as bags and bins (e.g., Cutt et al., 2008; Edwards & Knight, 2006) or areas for off-leash time (e.g., Degeling & Rock, 2012) or opportunity for one's dog to socialize with other dogs (e.g., Edwards & Knight, 2006) or for the dog walker to socialize with other dog walkers (e.g., Degeling & Rock, 2012) or to be in a wide-open green space (e.g., Cutt et al., 2008).

Mode of experience. Different dog walkers may focus on different things during a trail visit. Some may be focused on being outdoors and in a natural setting, while others may be focused on the chore of walking their dog; and others may be focused on the joy of walking the dog (e.g., Westgarth et al., 2014) or more focused on the social component when other dog walkers are present (e.g., Degeling & Rock, 2012; Edwards & Knight, 2006).

Lifestyle tolerance. On nature trails that welcome dogs, lifestyle tolerance can be thought to encompass beliefs about acceptable behaviors when walking with a dog. Perceptions of dog owners as having a social responsibility to care for and clean up after their dogs exist (Cutt et al., 2008). Public portrayals of dog walkers as a group were shown to accentuate the negative in describing dog walkers as ignoring others in public spaces, being intolerant of others' views, and as being entitled to special areas for their dogs in the public sphere (Toohey & Rock, 2015). A sense of obligation to leash one's dog was associated with the belief that others expected dogs to be leashed (K. J. H. Williams et al., 2009). People walking with a dog vary in how they understand the meaning of 'having the dog under control'; some think a leash is necessary while others rely on voice command (Edwards & Knight, 2006). Somewhat surprisingly, definitions for having a dog under control used in local trail regulations can vary from town to town, reflecting the variation in meanings embraced by individuals.

Compliance as Conflict Prevention

Policies and regulations that define acceptable dog walking behavior often exist (e.g., Kellner et al., 2017) with the intent of minimizing conflict potential, but the capacity to enforce them is usually insufficient (e.g., Lowe, Williams, Jenkinson, & Toogood, 2014; Weston et al., 2014). And even if capacity were sufficient, consideration would still need to be given to how best to enforce the regulations to avoid unintended negative consequences of some enforcement techniques (Greer et al., 2017; Webley & Siviter, 2000). As noted by Watson et al. (2016), a management decision to eliminate "… one use or the other can completely eliminate conflict, … [but] this, of course, has serious implications for the group eliminated" (p. 333). Especially given the unique relationships

humans often cultivate with domestic dogs (e.g., Grier, 2006; Serpell, 1986; Walsh, 2011 - no relation to this researcher), to simply ban dogs from natural settings as a conflict prevention measure has not been viewed as a viable option, but rather one that would engender ill will (e.g., Harby, 2010). How best then to encourage compliance?

Encouraging compliance. Identifying proven methods to achieve compliance is in the interest of both land managers and trail visitors. Curiously the literature is lacking in studies that evaluate the effectiveness of dog management policies and practices. A systematic review of the public health literature (Atenstaedt & Jones, 2011) and a complementary follow-up literature search (Rock, Graham, et al., 2016) found no controlled studies examining the effectiveness of methods aimed at preventing dog fouling, that is, preventing waste being left in public spaces. Weston et al (2014) in their literature review of dogs in open spaces, reserves and parks similarly found a lack of empirical evaluations of the effectiveness of dog management practices; they did however note reports of low compliance with dog regulations.

This gap is not to be taken as a lack of interest in the topic of managing dog walking behavior especially those regarding dog waste and leash use. Rather it seems that conducting controlled evaluative studies in the field is logistically unfeasible for most (and so too for this researcher who realized a controlled, evaluative study was beyond her resources of time, money, and trained assistants). In their stead, the literature offers descriptions of how dog presence and behavior affect wildlife and habitat (e.g., Lenth, Knight, & Brennan, 2008; Stigner et al., 2016); of how dog waste can be a contagion (e.g., Blenderman et al., 2018; Gaunt & Carr, 2011; Wells, 2006); of dog walker values, attitudes, beliefs (e.g., Lowe et al., 2014; Vaske & Donnelly, 2007;

Westgarth et al., 2014); of motivations for dog walking (Degeling & Rock, 2012; Edwards & Knight, 2006; K. Schneider et al., 2015); observations of non-compliance (Rock, Graham, et al., 2016; Stigner et al., 2016; Weston et al., 2014); and even how dog walking behaviors can contribute to outdoor recreation conflict (e.g., Arnberger & Eder, 2012; Vaske & Donnelly, 2007).

Enhancing compliance with visitor policies can help both land managers and land users reach their respective goals. When policies are complied with, land managers can more easily reach their competing goals of land protection while also protecting positive visitor experiences; when land users comply, they contribute to preserving a welcoming outdoor space (in both the social and natural realms) for their immediate and future enjoyment, and they avoid interfering with the visit goals of other visitors (e.g., Kellner et al., 2017). It thus remains a worthwhile question of how best to influence dog walking behavior, in public spaces, so that it more often complies with dog waste collection policies and with on-leash regulations.

Using the Health Belief Model to Inform Compliance Strategy

One well-researched theory used to develop persuasive campaigns is the Health Belief Model (HBM) (e.g., Abraham & Sheeran, 2005; Champion, 1984; Champion & Skinner, 2008; Janz & Becker, 1984; Rosenstock, 1974). Originating in the public health field in the 1950s as a way to explain why people did not engage in health prevention behavior (Rosenstock, 1974), the HBM has since also been applied to understanding behavior and attitudes related to promoting a healthy *natural environment* (e.g., Lindsay & Strathman, 1997; Morowatisharifabad, Momayyezi, & Ghaneian, 2012; Straub & Leahy, 2014; Yoon & Kim, 2016).

An example of value-discrepancy theory (Lewin as described by Rosenstock, 1974; Rosenstock, Strecher, & Becker, 1988), the HBM posits that a recommended health-related behavior intended to prevent a condition from occurring or worsening will be performed, if the individual perceives sufficient threat (susceptibility and seriousness) and the individual perceives the benefits of performing the recommended behavior intended to reduce threat, as outweighing the perceived costs of overcoming any perceived barriers to performing that behavior (Rosenstock, 1974; Rosenstock et al., 1988). The degree to which the individual believes they are capable of performing the behavior and that their actions have the capacity to reduce threat may also influence whether or not the recommended behavior is performed (Abraham & Sheeran, 2005; Rosenstock et al., 1988).

The prevention-related behavior is also more likely to be performed when reminders or triggers to act are used (Abraham & Sheeran, 2005; Champion & Skinner, 2008; Janz & Becker, 1984; Rosenstock, 1974) and perceptions may be related to motivation to perform health related behaviors (Abraham & Sheeran, 2005; Champion, 1984). Finally, researchers using the HBM theory acknowledged that demographic and psychosocial factors may influence perceptions; unlike demographic variables, psychosocial factors are malleable (e.g., Champion & Skinner, 2008). Components of the HBM and their relationships are illustrated in Figure 2.

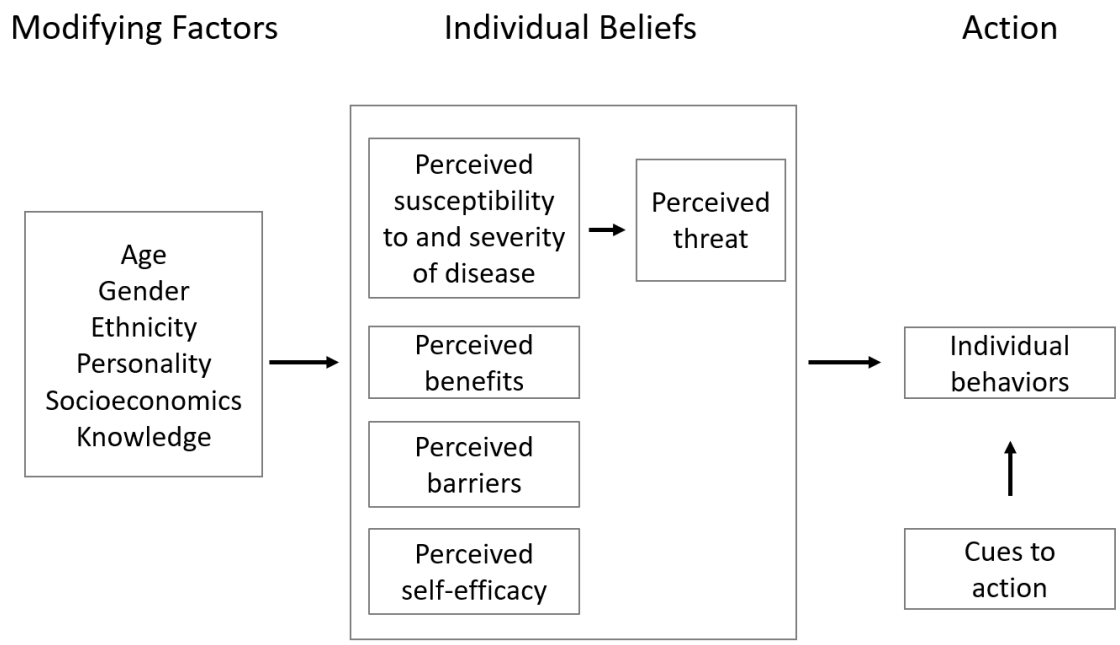


Figure 2. Health Belief Model (HBM).

Figure 2 above, as depicted by Champion and Skinner (2008, p. 49), illustrates how modifying factors influence individual beliefs which impact likelihood of performing behavior, a likelihood enhanced by the presence of a trigger to act.

It is helpful to recognize that the HBM does not act as, "… a strategy for change, rather it provides a way to identify what messages, media, and messengers will best deliver knowledge to reduce threat" (Typhina & Yan, 2014, p. 74). The HBM can do this because it hones in "…on modifiable psychological prerequisites of behaviour and provide[s] a basis for practical interventions across a range of behaviours" (Abraham & Sheeran, 2007, Conclusions, para. 1). The HBM informs the change process but does not define it. In their summary of the HBM, Champion and Skinner (2008) explained:

For behavior change to succeed, people must (as the original HBM theorizes) feel threatened by their current behavioral patterns (perceived susceptibility and severity) and believe that change of a specific kind will result in a valued outcome at an acceptable cost

(perceived benefit). They also must feel themselves competent (self-efficacious) to overcome perceived barriers to take action." Champion & Skinner, 2008, p. 50

Applying the HBM to dog waste management. In a novel test of the HBM, a recent study explored its use in developing a persuasive communication campaign intended to increase the collection of dog waste (Typhina & Yan, 2014). Informed by the tenets of the HBM, Typhina and Yan (2014), framed dog waste collection behavior from the understanding

> that people's behaviors are influenced by their perceptions of the *value* of an outcome (i.e., the value of not stepping in dog waste) and the *expectation* that performing a specific behavior will result in the desired outcome (i.e., avoiding the unpleasant experience of stepping in dog waste) … (p. 74).

Typhina and Yan (2014) situated dog waste collection as a behavior intended to prevent environmental harm by reducing a pollutant from entering the stormwater system; framed as such, the behavior is well-suited to the HBM framework. These authors sought to identify dog walkers' representative perceived indicators of the HBM constructs of threats, benefits, barriers and cues to action for cleaning up after their dogs. Typhina and Yan then explored relationships between the representative perceived indicators of the HBM constructs and self-reported behaviors regarding dog waste collection.

The researchers reported that the representative indicator of threat "failing to be courteous to others" (Typhina & Yan, 2014, p. 77) was positively correlated with self-reports of waste collection on streets and on trails. The representative indicator of benefit was "not to step in it" (p. 77) and correlated positively with behavior in a trail setting but not at all with behavior in a street setting. The representative barrier was "lack of

resources (bags and bins availability)" (p. 77) and negatively correlated with clean up behavior on streets but did not correlate with trail behavior. The representative cue to action for messenger (i.e., the person who would be most persuasive in delivering a message) was police officer but did not significantly correlate with self-reports of dog waste collection. The representative indicators for reminders to act were "…portable bag dispenser …, bag availability …, and reminder signs around town …" (Typhina & Yan, 2014, p. 78). For trail setting, both portable bag dispenser (i.e., a small container holding unused plastic bags which can be easily carried during a walk) and signs around town correlated positively with dog waste cleanup behavior; for street setting, bag availability (i.e., convenient access bags) positively correlated with self-reported clean up behavior (Typhina & Yan, 2014).

Drawing from their findings, Typhina & Yan (2014) suggested that dog walkers on trails be given a message that requests they be courteous to others by cleaning up after their dog and in so doing assure that they avoid the threat of stepping in it. Typhina & Yan further suggested using highly visible signs containing such a message and make available portable bag dispensers also labeled with this message. Of note, their results did not indicate who would be the most effective messenger since the representative messenger did not correlate with waste collection behavior in any setting. Another noteworthy finding was that despite the authors' framing of dog waste collection as a pro-environment behavior, dogwalkers' representative indicators of threat and benefit were not those related to the health of the environment; curiously, the researchers took no measure of participants' attitudes toward environment-related behavior.

The results reported by Typhina & Yan (2014) support continued exploration of the HBM as theoretical underpinning when developing a communication campaign to increase the collection of dog waste. Although they reported statistically significant correlations, effect sizes were small. Using an analytical method that simultaneously considers the impacts of each individual construct may help to understand whether the constructs influence behavior in collaboration with each other. Such analyses of HBM operationalizations was recommended by others as well (Abraham & Sheeran, 2007; C. J. Carpenter, 2010; Champion & Skinner, 2008; Jones et al., 2015). The literature will also be further enhanced by additional study of the HBM and dog waste collection in studies testing ways to measure the construct of cue to act: messenger; Typhina & Yan speculated that they may not have accurately measured it.

Antecedent Conflict Factors as HBM Modifying Factors

Both the Outdoor Recreation Conflict Model (ORCM) and the Health Belief Model (HBM) use expectancy theory. In the ORCM, the focus is on the perceived discrepancy between what is expected to occur and what actually occurs, to whom that difference is attributed, and how that difference affects the visitor experience; whereas in the HBM, the focus is on the perceived value of an expected outcome (threat reduction) if a recommended behavior is performed and how that balances any costs to performing the behavior. Both theoretical frameworks acknowledge the subjective nature of experience and rely on the perceptions of individuals to understand social processes. Both assume individuals have goals; in the ORCM it is assumed that recreationists pursue their activities with specific purpose (Manning, 2011) while in the HBM it is assumed that preventing illness (or preventing the worsening of an illness) is a valued goal (Champion,

1984). And the framework of each includes a group of antecedent variables that impact the core experience of interest, either conflict in the case of the OCRM or deciding to perform a recommended behavior in the case of the HBM.

The ORCM has been used to understand and predict conflict among different recreational users of the outdoors as well as used to inform resource management practices; whereas the HBM has been used to understand and predict health-related behavior as well as used to inform communications regarding the benefits of health-related behavior that prevents illness. In both models, the respective theoretical framework acknowledges the influence on perceptions of pre-existing psychosocial factors (antecedent conflict factors in the ORCM and modifying factors in the HBM). And it is here that a tangible link between the two frameworks can be made such that the HBM can be applied to a conflict-related issue existing in the outdoor recreation setting. Figure 3 visually depicts the role that antecedent conflict factors from the ORCM can play as modifying factors contributing to conflict/threat sensitivity in the HBM framework for a recommended conflict prevention behavior. Elements of the ORCM are shown in italicized and bold type in Figure 3.

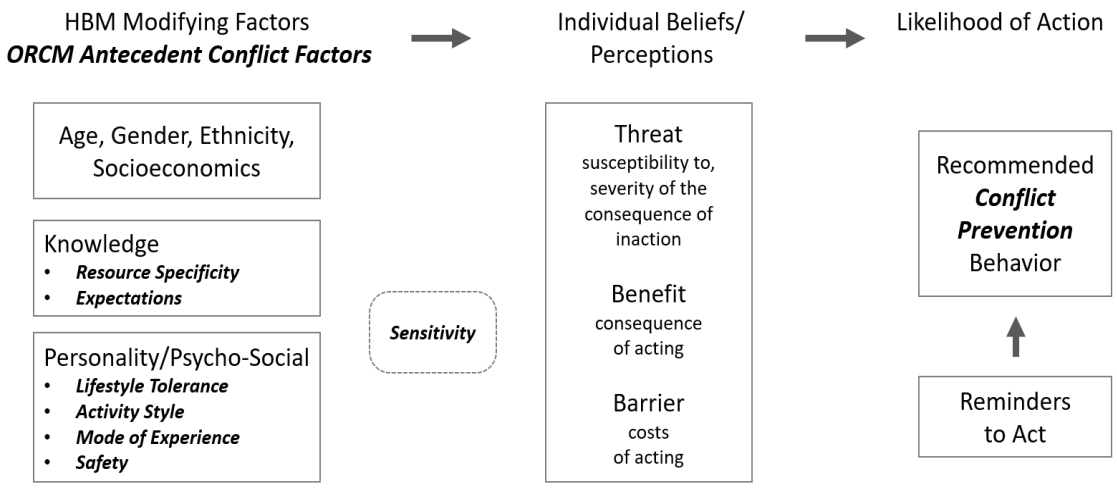


Figure 3. Integrating components of the ORCM into the HBM.

Figure 3 above is an adaptation of Champion and Skinner's (2008) depiction of the elements and connections in the HBM to illustrate inclusion of antecedent conflict factors from Manning's (2011) expanded Outdoor Recreation Conflict Model (ORCM). For this purpose, the HBM 'recommended behavior' is one that leads to reducing outdoor recreation conflict, i.e., behavior which prevents goal interference, whether for self, others, or the environment. Elements from the ORCM are indicated in italicized, bold type.

Because the HBM assumes that modifying factors affect individual perceptions of the HBM constructs, it is reasonable to think that the ORCM's antecedent conflict factors can function as modifying factors in the HBM framework and influence perceptions of the HBM constructs. Identifying antecedent conflict factors among dog walkers may provide insight into distinctions among dog walkers who collect dog waste or use a leash and those who do not. Such distinctions could then be explored in relationship to perceptions of the HBM constructs.

Research in outdoor recreation conflict has focused on conflicts and differences between user groups. There is however evidence of conflict within user groups (e.g., Usher & Gómez, 2017). Because the aim of the current research study was to develop a conflict prevention message that will increase dog-waste collection, the focus herein was on visitors to local nature trails who walk *with* dogs.

Understanding the relationships between antecedent conflict factors (activity style, resource specificity and lifestyle tolerance) and perceptions of dog-waste collection threats, barriers and benefits may shed light on who should be targeted with promotional communications rooted in HBM theory to enhance dog-waste collection. Additionally, known sensitivity to dog-related behaviors as potential sources of conflict may inform trail management. By incorporating aspects of the ORCM into the HBM a more robust conflict prevention strategy may evolve.

Statement of Purpose

The overarching purpose of this exploratory survey study was to evaluate the potential of pairing the ORCM with the HBM in the development of a persuasive message to prevent harm to the environment (both natural and social) by increasing the collection of dog waste on local nature trails. Dog management practices were measured as dependent variables through use of self-reported behavior regarding frequency of using a leash and of collecting dog waste. Some analyses considered relationships with both leash use and dog-waste collection behavior, respectively; while others were restricted to assessing relationships with only dog-waste collection in order to preserve cross study comparisons.

Research Objective One

The first aim of the current research was to describe dog walker perceptions and behavior in the context of walking on a local nature trail. ORCM theory was applied by describing antecedent conflict factors and perceptions of conflict potential. The antecedent conflict factors, assessed for visitors to local nature trails, who walked with a dog(s), were: activity style (measured as visit motivation and rooted in the work of Driver and colleagues – see Manning, 2011), resource specificity (measured as visit frequency (e.g., Backlund & Williams, 2004; Budruk, Stanis, Schneider, & Heisey, 2008; Colley & Craig, 2019; Tsaur, Liang, & Weng, 2014); and as a dimension of place attachment and modeled after Kyle, Graefe, Manning & Bacon 2004; Price, Blacketer, & Brownlee, 2018; Williams & Vaske, 2003), and lifestyle tolerance (measured as problem perception and modeled after Vaske & Donnelly, 2007). Measurement of conflict potential associated with human-dog interactions was adapted from Vaske & Donnelly; a measure of sensitivity was combined with a measure of past exposure as an indication of conflict potential rooted in human-dog interactions on local nature trails. The ORCM was tested by exploring relationships between antecedent conflict factors and self-reported leash use and dog-waste collection behaviors.

Research Objective Two

The second aim of the current research was to augment the findings of Typhina & Yan (2014) who used HBM theory as the framework for developing a persuasive communication message and strategy to enhance dog-waste collection. HBM theory was applied herein to the conflict-prevention behavior of dog-waste collection practices by identifying representative indicators for the core constructs of threats, benefits, barriers

and cues to act (modeled after Typhina, 2011; Typhina & Yan, 2014). HBM theory was tested by exploring the relationship between representative indicators of the HBM constructs and self-reported dog-waste collection (adapted from Typhina, 2011 and Typhina & Yan, 2014).

Research Objective Three

The third aim of the current study was to explore the relationship between ORCM antecedent conflict factors and representative indicators of HBM factors for the recommended action of dog-waste collection behaviors.

Research Objective Four

Finally, the current study integrated ORCM theory with HBM theory by assessing the relationships between representative indicators of HBM factors and dog-waste collection behavior when elements of the ORCM were used as stratifying variables.

Participants were visitors who walked with a dog(s) on local nature trails in central Massachusetts during the year of 2019. Participants were invited to complete an online survey. Distribution of the online link was accomplished through recruitment at trails, public postings, postings in local news outlets, email communications and Facebook postings. Using a purposive sampling method, trail visitors walking with a dog were invited to participate. Descriptive data were collected via participant-completed survey. Representative indicators of variables were determined by conducting Pearson's chi-square goodness-of-fit tests, $p < .05$. To explore relationships between categorical variables, Pearson's chi-square test of association was used, $p < .05$.

Research Questions

Descriptive and inferential questions were posed herein. Four descriptive inquiries provided the data for subsequent inferential testing.

Descriptive Research Questions

The descriptive questions were: What are the ORCM antecedent conflict factors of activity style, lifestyle tolerance and resource specificity as respectively measured by visit motivation, perception of human-dog interaction as problem behavior, visit frequency, and place identity for trail visitors walking with dogs? What is the conflict potential among trail visitors walking with a dog when human-dog interactions are considered as potential conflict sources? What are the self-reported dog walking practices of trail visitors as they pertain to collecting dog waste, disposing dog waste, and leashing dog? What are the representative indicators of the HBM constructs of threat, benefit, barrier and cues to act as they relate to dog-waste collection behaviors by trail visitors walking with dogs on their local nature trails?

Inferential Research Questions

The inferential questions that were posed, individually tested ORCM theory and tested HBM theory; two questions considered the pairing of ORCM with HBM.

Testing ORCM theory. How do the ORCM antecedent conflict factors of activity style, lifestyle tolerance, and resource specificity in trail visitors walking with dogs, respectively relate to self-reported leash use and dog-waste collection practices? How does conflict potential relate to dog management practice?

Testing HBM theory. How do the representative indicators of the HBM constructs of threat, benefit, barrier and cues to act for trail visitors with dogs relate to their self-reported dog-waste collection practices?

Pairing ORCM and HBM theories. How do ORCM antecedent conflict factors and representative indicators of HBM constructs relate to each other? And, in what ways if any do the ORCM antecedent conflict factors and conflict potential impact relationship between representative indicators of HBM factors and dog-waste collection practices?

Significance of the Study

By framing uncollected dog waste as a potential source of conflict, the research was able to apply ORCM theory to calculate conflict potential rooted in perceptions of and exposure to human-dog interactions while also describing antecedent conflict factors. In this way, context for conflict on local nature trails among visitors who walk with dogs can be described for land managers' considerations. Furthermore, the current research was able to test ORCM theory by examining relationships between antecedent conflict factors and both dog waste collection and leash use. Again, providing land managers with tailored information regarding their visitors.

By focusing on dog-waste collection behaviors the current research intended to add to the findings of others (Typhina & Yan, 2014) who creatively used the HBM to inform a dog waste management campaign. To this author's knowledge, the current study is only the second to utilize the HBM in this way. The current study heeded Typhina and Yan's concern that they may have inaccurately measured the construct of cue-to-act: messenger. The current research further expanded upon the work of Typhina and Yan, by integrating elements of the ORCM with the HBM framework, to explore

whether there was added value in developing a targeted conflict prevention message and strategy.

On a practical level, the current research had the potential to inform conflict prevention strategies used by trail management such that managers may be able to use information from their target audience (trail visitors walking with dogs and particularly those who do not pick up after their dogs) rather than guess at the perceptions of their visitors; may be able to craft a persuasive message rooted in their trail visitors' perceptions of threats and benefits (for example, Typhina & Yan (2014) suggested the message could be: By cleaning up after your dog you'll be courteous to others ***and*** you won't step it in it! And then the message could be associated with cues to perform the conflict-prevention behavior such as affixing the message to things that remove barriers, e.g., portable doggie waste bag dispensers and waste bins or have a relevant messenger, for example a land steward or another trail visitor, deliver the communication).

Management may also be able to evaluate its own role as land manager in eliminating some, or all, of the perceived barriers to dog walking behaviors that protect the natural and social environments on local nature trails (for example, Typhina & Yan (2014) reported a lack of bags and waste bins as barriers; based on these findings land managers can reflect on how they can be instrumental in eliminating such barriers). As a conflict prevention measure, land managers can consider tailoring the delivery of the HBM-informed messages based on the ORCM antecedent conflict factors that exist among those who visit local nature trails with their dogs. Finally, knowledge of conflict potential levels may guide trail managers in terms of the urgency with which they should approach developing and implementing conflict prevention strategies.

Definition of Terms

Conflict Sensitivity

Perceptions of conflict source (herein human-dog interactions) as a problem, if it were encountered. Perceived problem level categorized as not at all a problem, slight problem, moderate problem, and extreme problem.

Conflict Potential

A measure incorporating both conflict sensitivity and past exposure to the conflict source; perceptions of conflict source as a problem if it were to occur and reports of past observations of conflict source were used. Conflict potential was categorized as none or minimal (slight or not a problem and seen or not seen), triggered sensitivity (source perceived as moderate or extreme problem and encountered often or always), or as non-triggered sensitivity (source perceived as moderate or extreme problem and seen never or sometimes).

Dog Management Practices

Includes leash use *and* dog-waste collection behaviors measured by the self-reported portion of a visit that the participant usually has their dog(s) on leash when walking on a local nature trail and the self-reported frequencies with which dog waste is collected and bagged dog waste not left on the ground

Dog-waste Collection Behaviors

The self-reported frequencies of how often the participant picks up dog waste and how often leaves bagged waste on the ground when walking on a local nature trail. Responses were to the following questions: When you and your dog visit your usual local nature trail(s),

…how often do you pick up your dog's poop? Scale from 1 (never) to 5 (always)

…how often do you leave bagged poop on the ground? Scale from 1 (never) to 5 (always) and subsequently recoded to align directionally with the responses to the related dog-waste collection question of picking up dog poop.

Dog-waste Collection Index

Comprised of two items: self-reported frequencies for dog waste collection and for not leaving bagged dog waste on the ground, then recoded as consistent collector or inconsistent collector.

Health Belief Model (HBM)

Explains the performance of a health-related behavior by describing perceptions of the benefit of performing the health behavior as outweighing perceptions of the effort to overcome barriers to performing the behavior and by describing perceptions that the benefit of performing the behavior will alleviate severity of and susceptibility to the negative consequences of not performing the behavior (e.g., Champion & Skinner, 2008).

HBM Factors

Perceived threats, benefits, barriers and cues to act. Consistent with the HBM literature (Champion & Skinner, 2008) they were defined herein as follows:

Perceived threats. Those negative or feared consequences of not collecting and disposing of dog waste

Perceived benefit. Those positive or desired consequences of avoiding the threats of not collecting and disposing of dog waste

Perceived barriers. The costs (physical and psychological) associated with performing the recommended behavior of collecting and disposing of dog waste

Perceived cues to act. That which serves to prompt or trigger the performance of the recommended behavior, for example signage, trash receptacle or someone significant as messenger.

Leash Use Behavior

As self-reported in response to When you and your dog visit your usual local nature trail(s) for how much of the time do you have your dog(s) on leash? Scale from 1 (none of the time) to 5 (all of the time).

Leash Use Index

Comprised of one item: self-reported practice of leashing dog during a walk on a nature trail indicating the portion of the visit the participant usually has dog(s) on leash. Leash use responses were dichotomously coded to indicate whether the participant reported using a leash for the full duration trail visits (coded as consistent leash user = 1) or used a leash for less than the full duration (coded as inconsistent leash user 0).

Local Nature Trails

Term used herein to broadly encompass those walking/hiking trails open to the public on land formally or informally protected from development in two central Massachusetts municipalities; such trails have unpaved paths and no onsite staff. The State, municipalities, land trusts, and/or private entities may own the land. Where a conservation restriction is in effect, the local Conservation Commission has oversight of use. To be understood in contrast to trails in national parks with onsite park rangers.

Non-triggered Sensitivity

That level of conflict potential in which conflict source is perceived at levels of moderate or extreme and the source was never or only sometimes encountered during a local trail visit.

Outdoor Recreation Conflict (ORC)

That phenomenon which occurs when one experiences interference with achieving a visit goal and attributes the reason for the interference to others; includes attributions based on interactions (direct and indirect) between the parties and/or attributions rooted in the parties having different social values, beliefs or attitudes. See Jacob & Schreyer (1980), Manning (2011), and Vaske, Needham & Kline (2007).

Outdoor Recreation Conflict Model (ORCM)

A comprehensive model synthesizing a number of theories; encompasses both goal interference and social values conflict in outdoor settings; it identifies antecedent conflict factors that influence conflict sensitivity and perceptions of conflict in varied conflict dyads impacting visit experience and responses to conflict (Manning, 2011).

ORCM Antecedent Conflict Factors

Pre-existing psychosocial factors thought to influence sensitivity to conflict and perceptions of conflict (Jacob & Schreyer, 1980; Manning, 2011); three of which are assessed herein:

Activity style. Encompasses ways in which one engages with a recreational pursuit; it includes motivations and reasons for a visit to an outdoor setting. Measured herein by assessing reason for a trail visit and used to determine the degree to which a

visitor with a dog was engaged in a recreational visit to an outdoor setting versus engaged in satisfying a responsibility associated with being guardian of a dog.

Resource specificity. The degree to which a setting has particular purpose or meaning for a visitor. Measured herein as visit frequency and as place identity – one of the dimensions of place attachment.

Lifestyle Tolerance. A measure of acceptance of behavior, values, attitudes different from one's own. Measured herein as perceptions of human-dog interactions as problem behaviors.

Tolerance Index-Direct

Values for the Tolerance Index-Direct ranged from zero out of five (0/5) to five out of five (5/5) direct human-dog interactions perceived as a problem; the closer the value was to 1.0 (i.e., 5/5) the less tolerant the participant was of human-dog interactions that involved the dog interacting directly with a visitor through touch or approach as reflected in perceptions of the interactions being moderate or extreme problems, if they were to occur . Original item responses were recoded such that 0 = 'no problem' was comprised of the response 'not at all a problem' and 1 = 'problem' comprised of the responses 'slight problem', 'moderate problem', or 'extreme problem' as guided by techniques used by others (Carothers, Vaske, & Donnelly, 2001; Gibson & Fix, 2014; Vaske et al., 1995).

Tolerance Index-Dog Waste

Values for Tolerance Index-Dog Waste ranged from zero out of two (0/2) to two out of two (2/2) dog-waste related human-dog interactions perceived as a problem; the closer the index value was to 1.0 (i.e., 2/2) the less tolerant the participant was of owners

not picking up after their dogs or of owners leaving bagged waste on the trail, as reflected in perceptions of the interactions being moderate or extreme problems, if they were to occur. Original item responses were recoded such that 0 = 'no problem' was comprised of the response 'not at all a problem' and 1 = 'problem' comprised of the responses 'slight problem', 'moderate problem', or 'extreme problem' as guided by techniques used by others (Carothers et al., 2001; Gibson & Fix, 2014; Vaske et al., 1995).

Tolerance Index-Indirect

Values for Tolerance Index-Indirect ranged from zero out of five (0/5) to five out of five (5/5) indirect human-dog interactions perceived as a problem ; the closer the index value was to 1.0 (i.e., 5/5) the less tolerant the participant was of dog-related behavior that indirectly impacted a visitor's visit (e.g., wildlife fleeing dogs or owners calling after their dogs), as reflected in perceptions of the interactions being moderate or extreme problems, if they were to occur. Original item responses were recoded such that 0 = 'no problem' was comprised of the response 'not at all a problem' and 1 = 'problem' comprised of the responses 'slight problem', 'moderate problem', or 'extreme problem' as guided by techniques used by others (Carothers et al., 2001; Gibson & Fix, 2014; Vaske et al., 1995).

Triggered sensitivity

That level of conflict potential in which conflict source is perceived at levels of moderate or extreme and the source was encountered often or always during a local trail visit.

Chapter Summary

The persistence of dog walking behavior on local nature trails that harms the environment (both natural and social) was framed as a potential source of conflict using the ORCM. The HBM and its prior use in dog waste management was described. Using the HBM to inform a persuasive strategy framed as conflict prevention invited consideration of ORCM antecedent conflict factors as HBM modifying factors. The purpose of the current study was described and both descriptive and inferential research questions stated. An in-depth review of the literature will be offered in Chapter Two and will cover the history, development and testing of both the ORCM and the HBM, as well as explain the reasoning for pairing the ORCM with the HBM. Chapter Three will describe the quantitative methodology including instruments and planned analyses. Chapter Four will report results for descriptive and inferential questions. Finally, Chapter 5 will discuss the findings, conclusions that can be reached, implications for practice and future research, as well as of the study.

Chapter 2: Literature Review

Outdoor recreational pursuits on protected land inherently compete with the goals of conservationists and land stewards (Flathing & Cordell, 1995; Manning, 2007; Watson, Cordell, Manning, & Martin, 2016). Conserving land while preserving opportunities for humans to be in natural settings is important for the health of natural resources as well as the health of visitors (Carter & Horwitz, 2014; Clayton & Saunders, 2012; Russell et al., 2013). Land use professionals remain challenged to reach these inherently competing goals despite regulations and policies intended to preserve both the natural environment and visitor experience (Arnberger & Eder, 2012; Bowes et al., 2018; Knight & Gutzwiller, 1995; Manning, 2011; Stigner et al., 2016).

Optimizing visitor compliance with such policies will proactively reduce conflict potential by helping to protect both natural resources and visitor experience. But how best to shape visitor behavior to comply with regulatory policies remains a common conflict-prevention challenge for land use professionals (e.g., Arnberger & Eder 2012; Knight & Gutzwiller, 1995; Manning 2011; Stigner, Beyer, Klein, & Fuller, 2016). Land managers are particularly challenged by visitors who bring their companion dogs with them and then do not comply with policy requirements for leashing and cleaning up after pets (Bowes et al., 2018; Maguire, Miller, & Weston, 2019; Stigner et al., 2016; Webley & Siviter, 2000; Wells, 2006; Wilson, 2014). In such cases, both the natural and social environments are at increased risk of being diminished by the noncompliance and as such the noncompliance can be viewed as a source of potential conflict between and among trail visitors as well as between managers and visitors. As a conflict prevention measure, enhancing compliance with visitor policies will ease the challenge of meeting competing

goals for the land manager as well as enhance the likelihood that visitors to the outdoors will enjoy positive experiences (i.e., visits free from destructive conflict).

Using dog walking behavior on nature trails as an example of a potential source of conflict, this chapter will first describe issues related to walking with a dog in public spaces. Conflict will be defined under the theoretical umbrella of the outdoor recreation conflict model (ORCM) and the evolution of the model described. The Health Belief Model (HBM) will then be described as a theory-based framework from which to understand how individuals make decisions regarding prevention behavior. Its past use in understanding dog-waste collection practices and how it could inform a behavior change strategy will be described. Finally, an argument will be made for examining the relationship between outdoor recreation antecedent conflict factors and the core factors of the HBM and further arguing for integrating the ORCM into the HBM framework with the objective of conflict prevention. The HBM may thus hold promise as a useful theoretical approach for using the ORCM to develop stakeholder-informed strategies to promote behavior that reduces sources of conflict.

Some Consequences of Walking with a Dog

In the United States, approximately 84.6 million homes (i.e., 68% of all homes) own a pet according to a recent pet owner survey (American Pet Product Association, APPA, 2018). Of these, 60.2 million homes included at least one pet dog; in total, almost 90 million dogs were owned as pets according to the 2017-2018 pet owner survey (APPA, 2018). The prevalence of dogs as companions may reflect the special bonds of attachment that can develop between humans and dogs (Grier, 2006; Serpell, 1986; Walsh, 2011 - no relation to this researcher). In the field of public health, walking with a

dog has been associated with and used to encourage healthy states of well-being with regard to the social, physical and mental health spheres (Rock, Degeling, et al., 2016; Toohey & Rock, 2011; Westgarth et al., 2014).

Despite these obvious positive consequences of dog ownership and walking with a dog, when people in natural outdoor settings are accompanied by their pet dogs, management challenges surface because there is potential for dogs to also harm natural resources and/or the social environment. As listed in Table 1, examples of potential harmful impacts of uncollected dog waste include that it: was aesthetically unpleasing (Typhina & Yan, 2014; Wells, 2006) and undesirable to step in (Typhina & Yan, 2014); diminished visitor experience (Verlic et al., 2015); can act as a contagion by transmitting zoonotic bacteria and parasites – those that can be transmitted from animals to humans causing illness (Blenderman et al., 2018; Gaunt & Carr, 2011; Wells, 2006; Weston et al., 2014); can affect water quality either by affecting nutrients which alter what can live and grow in the water (e.g., Stevens & Hussmann, 2017) or by elevating levels of fecal coliform and other bacteria in water sources (see Typhina & Yan, 2014); and it can trigger sanctions due to risk perception as a source of water pollution (Carosa, 2017).

Evidence of potential harmful impacts of unleashed or uncontrolled dogs includes wildlife (e.g., shorebirds) disturbed, chased, or displaced (Bowes et al., 2018; Stigner et al., 2016; Weston et al., 2014); sensitive habitats disturbed or damaged (Bowes et al., 2018); diminished wildlife activity of mule deer, squirrels, rabbits and bobcat near trail areas (Lenth et al., 2008); off-leash dogs running freely, habituated wolves such that the dogs were subsequently viewed as prey and indeed attacked not only while off leash but also while on leash (Bowes et al., 2017); dogs jumping on visitors or pawing visitors and

visitors calling after their dogs detracted from visit experience (Vaske & Donnelly, 2007); dog walkers' visit experience affected because the number of visitors required the leashing of dogs for safety reasons (Arnberger & Eder, 2012); visitors did not like dog interactions, especially when there were a lot of dogs or when they were not leashed (Arnberger et al., 2017); negative perceptions of dog waste and uncontrolled dogs may contribute to safety fears and reduced activity levels (Toohey & Rock, 2011); and noncomplying dog walkers viewed negatively by some complying dog walkers (Cutt et al., 2008).

Table 1

Examples of Documented Impacts of Dog Presence, Uncollected Dog Waste and Dogs Off Leash on Natural and/or Social Environments

Source		Examples of Natural Environment Impact
Blenderman, Taff, Schwartz, & Lawhon	2018	Dog waste as contagion of zoonotic bacteria and parasites Kachnic et al., 2013; Rahim, Barrios, McKee, McLaws, & Kosatsky, 2017; Wilson, 2014; Acosta-Jamett, Chalmers, Cunningham, Cleaveland, Handel & Bronsvoort, 2011; each as cited by Blenderman et al
Bowes, Keller, Rollins, & Gifford	2018	See p. 121 for citation of others' work that reported bird disturbance from dogs off leash and the habituation of wolves to dog presence making dogs accessible prey
Gaunt & Carr	2011	Reported parasites in canine fecal samples; cites other studies with higher rates of parasite in canine fecal samples
Lenth, Knight & Brennan	2008	Trail areas that allowed dogs were noted to have reduced activity of mule deer, squirrels, rabbits and bobcat compared to trail areas where dogs were prohibited
Stigner, Beyer, Klein, & Fuller	2016	Shorebird presence increased when dogs were restricted from the area
Stevens & Hussmann	2017	Suggested dog waste can alter nutrients in water resulting in algae blooms which promote growth of invasive flora
Typhina & Yan	2014	Municipal staff believed fecal coliform in river water to be from dog waste left on the ground (per Buchert, personal communication, as cited by Typhina & Yan)
Wells	2006	Notes uncollected dog waste to be unpleasant and an eyesore; also cites other studies that report on the toxicity of uncollected dog waste as contaminant and public health risk
Weston, Fitzsimons, Wescott, Miller, Ekanayake, Schneider	2014	Systematic literature review that concluded: Predatory behavior by dogs toward wildlife; wildlife disturbed by dog presence; and disease transmission potential

Table 1 continued...

Source		Examples of Social Environment Impact
Arnberger & Eder	2012	Crowding contributed to increased use of leash and potentially interfering with goal of letting dog run free
Arnberger and colleagues as cited in Arnberger et al (2017)	2017	"found urban forest visitors disliked interactions with dogs, particularly when the dogs were not leashed and were numerous" p. 237
Bowes, Keller, Rollins & Gifford	2018	Off leash dogs contribute to '…conflict with other park visitors' p. 119
Carosa	2017	Enactment of sanctions – such as $1,000 fine – because of perceived bacterial risks associated with uncollected dog waste near water sources
Cutt, Giles-Corti, Wood, Knuiman, & Burke	2008	Negative perceptions of those who do not pick up after their dogs or do not leash their dogs serve as irritants to those who do
Toohey & Rock	2008	Scoping review of literature indicated dog waste and uncontrolled dogs were viewed negatively, associated with lower activity levels, and viewed as "affronts to safety"
Typhina & Yan	2014	Aesthetically displeasing and risk of stepping in dog waste is undesirable
Vaske & Donnelly	2007	Problems associated with off-leash dogs: wildlife fleeing, dogs jumping on a visitor, dogs pawing a visitor and dogs flushing birds. Owners calling for their dogs and leaving dog waste uncollected contributed to conflict.
Verlic, Arnberger, Japelj, Simoncic, & Pirnat	2015	Uncollected dog waste negatively impacted visit experience
Wells	2006	Noted uncollected dog waste to be unpleasant and an eyesore

While all of these impacts incorporate dog presence or dog walker behavior, it is worth noting that the environmentally conscious perspective never loses sight of the inherent tension between human use and its impact on the natural environment. Reed and Merenlender (2011) examined the effect of dog presence on wildlife on protected lands and found that wildlife disturbance was attributable to the greater number of visits to areas that allowed dogs, in contrast to the number of visits to areas that did not allow dogs. Number of visits and not dog presence was deemed the influential variable. These researchers consequently suggested that the competing goals of land conservation and opportunities for visitor experiences could be more easily be attained by using the cost-effective approach of simply zoning some protected areas as open to the public (with and without dogs) and other areas as closed to visitors, to be held as protected reserves. Even

so, insights into how to manage public settings that welcome dogs continue to be needed in order to minimize negative impacts and the potential for conflict.

The possibility for harmful impacts from walking with dogs in public spaces calls for pre-emptively influencing visitor behavior. Policies and regulations for defining acceptable dog walking behavior often exist, but the capacity to enforce them is usually insufficient (e.g., Lowe et al., 2014; Weston et al., 2014). Even if capacity were sufficient enough, consideration would need to be given to how best to enforce the regulations because of unintended negative consequences of direct enforcement techniques (Greer et al., 2017; Webley & Siviter, 2000). Given the unique relationships humans cultivate with domestic dogs (e.g., Grier, 2006; Serpell, 1986; Walsh, 2011 - no relation to this researcher), to simply ban dogs from natural settings as a conflict prevention measure has not been viewed as a viable option, but rather one that would engender ill will (e.g., Harby, 2010). Meanwhile, the popular press (e.g., Carosa, 2017; Haddadin, 2018; Libon, 2018), professional media (e.g., Dolesh, 2018) and the scholarly literature (e.g., Blenderman et al., 2018; Maguire et al., 2019; Rock, Graham, et al., 2016; Vaske & Donnelly, 2007; Weston et al., 2014) describe the persistence of dog walking behavior that does not comply with dog waste or leashing policies.

Evaluations of the effectiveness of methods to promote such compliance are lacking (Atenstaedt & Jones, 2011; Rock, Graham, et al., 2016). Describing dog walking practices (e.g., dog-waste collection behavior and leash use behavior) through the framework of the outdoor recreation conflict model will add to the scholarly literature by offering consideration to factors that precede or affect the experience of conflict. Use of such a framework can provide theoretically-informed implications for land managers by

their considering preemptively the factors in the framework when developing management approaches intended to prevent conflict (through enhancing visitor behaviors that comply with policies). When resources (monetary as well as human) become available, then such methods can be evaluated for their effectiveness. As a stepping-stone to a proposal that frames interacting with a dog as a potential source of conflict, the outdoor recreation conflict model will next be addressed.

Outdoor Recreation Conflict

Outdoor recreation, herein, is considered as that field of study which considers activities enjoyed in natural settings whether in the wilderness backcountry or the urban/suburban frontcountry. It is a multi- and interdisciplinary, applied field that emerged in the years after World War II when "… rapid gains in economic prosperity, expanding transportation networks, increasing leisure time, … combined to produce dramatic and sustained increases in the use of parks and other outdoor recreation areas" (Manning, 2011, p. 4). A highly regarded scholar and practitioner in the field of outdoor recreation, Manning historically positioned the field by explaining that the then-new demand on outdoor resources led to overuse and crowding which subsequently became fodder for the study and expansion of the outdoor recreation field. As he described, early studies were ecological in focus but saw a shift, to include the social experience of outdoor recreation, beginning in the 1960s and 1970s. Visitor experience became a topic of interest in addition to the ecological impacts. Conflicts between visitors engaged in different activities became a popular research focus for outdoor recreation scholars and practitioners. Over time, studies progressed from being descriptive to being explanatory providing useful implications for resource and recreation management (Manning, 2011).

As interest in studying social conflict in outdoor recreation grew, so too did the need for theory-based models.

A Goal Interference Model

In the shift from descriptive studies to explanatory ones, Jacob & Schreyer (1980) were among the first to theorize about the causes of conflict among recreationists using natural resources. Their proposed model was one in which "conflict [was] defined as goal interference attributed to another's behavior" (Jacob & Schreyer, 1980, p. 368). In the context of outdoor recreation, this definition assumed that visitors were seeking certain outcomes from their visits, that visitors had visit goals (Jacob & Schreyer, 1980). To the extent that interference attributed to the behavior of other people produced a discrepancy between sought-after visit outcomes and actual outcomes, then conflict was experienced (Jacob & Schreyer, 1980; Manning, 2011). In this way, Jacob and Schreyer acknowledged applying discrepancy theory, citing the hallmark work of Fishbein and Azjen, to explain recreation conflict as a unique example of dissatisfaction associated with discrepancy (i.e., visitor dissatisfaction with visit outcome because visitor outcome did not match or meet expectations for the visit and the dissatisfaction due to the discrepancy was attributed to the actions of other visitors).

Of equal note, Jacob & Schreyer (1980) asserted that goal interference was not necessarily a reflection of goal incompatibility or simply competition for limited resources. They drew on the early work of conflict specialist Morton Deutsch (Deutsch, 1971) to explain that visitors may actually have the same goals but go about achieving them in different ways which then created conflict. For example, two outdoor enthusiasts might have the same goal of enjoying an afternoon in the forest; but they engage in

different activities (hiking versus horseback riding), activities that might interfere with others' goals for the visit. And so, the hiker who attributes the activities of someone else (a horseback rider) as being the cause of their dissatisfaction with their visit experience would be described as experiencing conflict. And to the extent that access to natural resources was limited, conflict would only exist when one visitor acknowledged the lack of access as interfering with their realizing their visit goals and attributed the lack of access to the actions of others. For example, the horseback rider who is banned from their favorite trails so that non-horseback riders could use those trails, would only experience conflict if their enjoyment was less than what it would have been had they been able to ride on their favorites ***and*** they attributed the diminished satisfaction to someone else, for example, the land managers implementing such a ban.

Extending the example to the activity of walking with a dog, a visitor to a local nature trail (with or without a dog), looking forward to a walk outside, may not enjoy the walk as much if they step in dog waste or if another visitor's dog charges at them or licks their legs. The dissatisfaction with the visit outcome because of interference with personal goals for the visit, in such cases, might be attributed to the visitor who did not clean up after their dog or did not leash their dog. Interestingly, Jacob & Schreyer (1980) noted that their goal interference model (also known as the interpersonal conflict model per Manning, 2011) did not require two visitors to come into direct contact with each other for there to be conflict.

The current illustrative example can also be further used to demonstrate how asymmetrical views of conflict can develop, in that the visitor who steps in dog waste is upset with the dog walker who left it there, but *that* dog walker is not experiencing

conflict and may be oblivious to the fact that their actions diminished the visit experience for someone else; or a trail manager may be upset with either the dog walker who failed to remove the dog waste or with the dog walker who allowed their dog to go off leash disturbing wildlife and trampling vegetation; but again in neither case does the offender necessarily realize they are infringing on someone else's goals and consequently contributing to conflict.

Jacob & Schreyer (1980) used the existing literature to further propose pre-conflict conditions or factors that would set the stage for conflict. Herein these are referred to as antecedent conflict factors. Quoting from Jacob & Schreyer, the original four antecedent conflict factors were:

> Activity Style – the various personal meanings assigned to an activity.
>
> Resource Specificity – the significance attached to using a specific recreation resource for a given recreation experience.
>
> Mode of Experience – the varying expectations of how the natural environment will be perceived.
>
> Lifestyle Tolerance – the tendency to accept or reject lifestyles different from one's own. (p. 370)

And as observed by Manning (2011), the antecedent conflict factors, when considered generally, "…can be seen to encompass many of the variables [subsequently] found to be statistically related to conflict …For example, motivations for recreation can be interpreted as part of one's recreation activity style, social values as contributing to lifestyle tolerance, and place attachment as a subset of resource specificity" (p. 216).

Over time, other research indicated that antecedent conflict factors also included expectations (e.g., Ivy et al., 1992; Mann & Absher, 2008) and safety (e.g., Blahna et al., 1995; Vaske et al., 2000). And it was suggested by several (Mann & Absher, 2007, 2008; Ramthun, 1995; Watson, Niccolucci, & Williams, 1993, 1994) that antecedent conflict factors actually "determine sensitivity to conflict rather than conflict as it is experienced…" (Manning, 2011, p. 216).

Conflict was however rarely measured as goal interference (see Todd & Graefe, 1989 for a rare example) because it required three assessments to answer the one question: what were the goals for the visit, which were the most important ones; were any not reached; if not, why not? With answers to these questions the researcher could then determine whether or not conflict had occurred. It was more often indirectly explored by assessing perceptions of crowding or perceptions of levels of enjoyment or satisfaction with the visit (see Manning, 2011).

A Social Values Model

The goal interference model continues to be used, but as the outdoor recreation field matured, it was recognized that a different type of conflict was also experienced by outdoor recreationists: conflict rooted in values, beliefs and norms (Carothers et al., 2001; Gibson & Fix, 2014; Vaske et al., 1995; Vaske et al., 2007). This alternative model came to be known as the social values model (Manning, 2011) and continues to shape how outdoor recreation conflict is thought about decades later (Gibson & Fix, 2014). Figure 4 depicts the conflict typologies that were initially suggested when a social values model of recreation conflict was applied. By combining whether a behavior was perceived to be a

problem if it were to be observed, with whether the behavior was indeed observed, Vaske and colleagues operationalized typing conflict based on beliefs, values, and norms.

		Perceived Problem	
		No	Yes
Observed	No	No Conflict	Social Values Conflict
	Yes	No Conflict	Goal Interference/ Interpersonal Conflict

Figure 4. Conflict typologies.

Figure 4 above is adapted from Manning (2011), as informed by Vaske, Donnelly, Whitman, and Laidlaw (1995), and Vaske, Needham, and Cline (2007); the possible conflict typologies are depicted as a function of whether the behavior of interest was observed and whether it was perceived as a problem.

From the outset, Vaske et al. (1995) underscored, from the perspective of management implications, the importance of identifying type of conflict. These authors observed that goal interference conflicts are likely to benefit from management interventions that separate visitors engaged in different activities (i.e., zoning), while management strategies focused on educating visitors, on the other hand, may be more effective with conflicts that are based on differences in norms and values. They asserted that such social values conflict may not even require there to be direct interpersonal

interaction for conflict to occur thus rendering zoning interventions useless in such situations. Vaske et al further observed that it was common for social values conflict to be the type of conflict between users and management or interest groups and management.

Over time is was realized that the model had short-comings. “People who have observed an event and perceive this event as a problem may be expressing social values, an interpersonal conflict, or a combination of both” (Carothers et al., 2001, p. 58). Studies evaluating the possibility for simultaneous experiences of both interpersonal and social values conflict were conducted by adding a third element to the assessment: were visitors bothered by just knowing that other visitors engaged or otherwise capable of engaging in the potentially problematic behavior of interest were in the area (e.g., Vaske & Donnelly, 2007; Vaske et al., 2007). These studies reported evidence in support of this new conflict category. Regarding off-leash dog behavior, Vaske and Donnelly (2007) further distinguished among visitors experiencing goal interference conflict by identifying those that were experiencing both goal interference and social values conflict by asking visitors whether they agreed with the statement “Just knowing that off leash dogs are allowed in OSMP areas is a problem for me, even if I never see them” (p. 11). Those who experienced goal interference conflict *and* agreed with this statement were categorized as experiencing both. Similarly, Vaske et al (2007) examined conflict between cross country skiers and snowmobilers and found evidence that some indeed experienced both goal interference and social values conflict. This researcher wonders whether the addition of this question more accurately characterizes sensitivity to a

conflict source than it does the experience of conflict during a visit to an outdoor natural setting.

Nonetheless the model continues to be used to describe the conflict experience and to recognize the multifaceted complexity of the conflict phenomenon as suggested more recently by Gibson and Fix (2014) who explored the idea that a latent-behavior conflict category may exist. One's experience would be categorized as such when the following three conditions were present: 1. the potentially offending behavior of interest is not observed and 2. would be a problem if observed, and 3. is not considered bothersome simply because the other visitor capable of the behavior is present. Such a conceptualization again reminds this researcher of the notion of conflict sensitivity (see Manning, 2011, p. 216); and others have previously commented on such ambiguity. In their review of outdoor recreation conflict, Graefe & Thapa (2004) noted with regard to social values conflict that research participants' "… responses might be considered a measure of potential conflict, since they are speculating about behaviors that they believe exist even though they have not experienced them" (Graefe & Thapa, 2004, p. 219).

Perhaps the approach of Gibson and Fox (2014) is better aligned with measuring sensitivity to potential sources of conflict rather than conflict itself. Regardless, the suggestion of a 'latent-behavior conflict category' reminds all that there remains a lack of consensus regarding what constitutes conflict and how to measure it, as had been observed by others in the past (Graefe & Thapa, 2004; Watson, 1995).

These two models of outdoor recreation conflict (goal interference and social values conflict) can be considered complementary in terms of providing frameworks from which to understand and manage conflict experiences in the outdoors. Worth noting

is a bit of overlap between the models, “For example, one of the four factors influencing conflict in the goal interference model is ‘lifestyle tolerance,’ which may be closely related to social values” (Manning, p. 211). Recognizing that outdoor recreation conflict can be rooted in different types or a combination of different types of psychosocial factors associated with perceptions of conflict, it is then no surprise that Manning included both models in an “expanded conflict model” (see Manning, 2011, p. 216).

A Comprehensive Model of Outdoor Recreation Conflict

Manning (2011) synthesized years of work by several researchers to produce a model of outdoor recreation conflict that encompassed conflict as described by the goal interference model and as described by the social values conflict model. Herein, this expanded model is referred to as the outdoor recreation conflict model (ORCM) and encompasses antecedent conflict factors, the conflict experience, and visit impacts, as illustrated in Figure 1 (See page 4).

Manning (2011) suggested that the antecedent conflict factors were determinants of conflict sensitivity before the conflict experience whether rooted in goal interference and/or social values. The model does not restrict conflict parties to just recreationists, thus it can accommodate conflicts between different user groups of the natural resource. With regard to conflicts involving recreationists, however, the impact of the conflict may be a decrease in satisfaction or enjoyment with the visit experience (see Carothers, et al., 2001; Manning, 2011) and/or may result in the use of coping strategies that either focus on solving the problem or that address cognitive/emotional impacts of the conflict (e.g., Schneider, 2000a; 2000b; Schneider & Hammitt, 1995; Schneider & Wynveen, 2015). Currently the model does not include implications for conflict management.

Conflict parties. As shown in Figure 1 (See page 4), outdoor recreation conflict may be between visitors engaged in the same outdoor activity or between visitors engaged in different activities, or between managers and visitors, or between recreationists and those using the natural resources for reasons other than recreation (Jacob & Schreyer, 1980; Manning, 2011). Studies of conflict in outdoor recreation have been dominated by a focus on inter-activity conflict, that is, conflict between visitors as members of different user groups such as between canoeist and motorboater (Ivy et al., 1992), or hiker and biker (Mann & Absher, 2008), or skier and snowboarder (Thapa & Graefe, 2004).

A common finding in outdoor recreation research was that one user group typically perceived conflict with the other, while the other user group did not reciprocally perceive the same (see Manning, 2011). Dubbed asymmetrical conflict, such experiences were frequently documented and persist, but evidence supports avoiding the assumption that conflict involving different user groups will necessarily be asymmetrical (Manning, 2011; Thapa & Graefe, 2004). For example, researchers reported conflict between snowboarders and skiers to be symmetrical, that is conflict between the user groups was bilateral (Vaske et al., 2000; Vaske et al., 2007). Although inter-activity conflict dominated research findings, conflict among visitors engaged in the same recreational activity was occasionally studied (e.g., Todd & Graefe, 1989; Usher & Gómez, 2017) as was conflict between visitors and managers (e.g., Clark, Hendee, & Campbell, 1971; Gage, 2015, 2016; Martin, McCool, & Lucas, 1989; Riley et al., 2015; Vistad, 2003) and conflict between recreation users and other resource users (e.g., McAvoy, Gramman, Burdge, & Absher, 1986). Thus, any study such as the current one which focuses on

potential conflict *within* a user group (i.e., visitors walking with a dog on local nature trails) assuredly adds to the literature on outdoor recreation conflict.

Sensitivity to conflict. Attempts to operationalize Jacob and Schreyer's (1980) proposal that different antecedent factor groups predict conflict experiences between different user groups, led some researchers to ask a slightly different question. Were some visitors more likely to be bothered by the behavior of visitors engaged in an activity different from their own activity (i.e., by the behavior of an 'outgroup')? And if so, were they more likely to experience conflict during their visit? In this way, might some be more sensitive to conflict than others?

When operationalizing conflict sensitivity, researchers focused on measures of tolerance for outgroup behavior. Thus, as originally described by Ramthun (1995) the sensitivity was to outgroup behavior and not toward perceptions of goal interference. In his study of hikers and mountain bikers, Ramthun (1995) shifted the focus by asking participants to rate whether the behaviors of outgroup visitors (either hikers or bikers) would interfere with important visit objectives, if those behaviors were encountered during a visit. He found that this evaluation of outgroup behavior was a predictor of actual conflict attributions, which were experienced asymmetrically as more hikers attributed goal interference to bikers, than bikers attributed to hikers. Ramthun suggested that the outgroup evaluations pre-conflict reflected a "… stereotyping process [that] seems to lead individuals to make assumptions about the probable behavior of outgroup members and these assumptions, in turn, make the individual more sensitive to interference by members of that group" (1995, p. 166).

Work by others, however, showed factors *other than* perspectives on outgroup behavior better predicted conflict attributions (Watson et al., 1993, 1994). As is often the case when trying to operationalize theory, researchers operationalize differently (e.g., Graefe & Thapa, 2004). And so was the case with the studies by Watson et al and Ramthun (1995) which used different measures of outgroup tolerance. Watson and colleagues measured perceptions of tolerance for the outgroup pre-conflict by measuring the degree to which hikers and horseback riders thought themselves similar, and by measuring perceptions of others as competing for the outdoor setting. Those who reported encounters with anyone from the 'other' group as undesirable were considered to have a predisposition toward conflict (Watson et al., 1993). At one research site, hikers were predisposed to experience conflict if they indicated valuing solitude to a higher degree; at a second research site, a predisposition to experience conflict was most associated with perceptions that the hikers and horseback riders were in competition. Though related to perceptions of the outgroup, it is questionable whether Watson and colleagues were measuring the same construct that Ramthun had measured. Regardless, considered collectively, the works of Watson and colleagues along with those of Ramthun, indicated that a 'predisposition to conflict' or 'a sensitivity to conflict' may be a featured aspect of the conflict experience, though multidimensional as well as context dependent.

More recent work by Gibson and Fix (2014) and Vaske and colleagues (e.g., Vaske and Donnelly, 2007; Vaske et al., 2007) implicitly if not explicitly incorporated a measure of sensitivity to conflict as they operationalized the social values model and proposed its expansion to include conflict experienced as *both* goal interference and

social values (see Vaske et al, 2007) and to include an additional type, that of latent-behavior conflict (Gibson & Fix, 2014). Especially germane to the current research study is how Vaske and Donnelly (2007) used perceptions of problem level for 11 behaviors related to dog presence to determine type of conflict. Vaske and Donnelly simultaneously considered whether or not a behavior was perceived to be problematic and whether or not the behavior was actually observed during a typical trail visit for each of their 11 human-dog interactions; then using cluster analysis, they reported three groups that perceived conflict differently:

> Cluster 1 (27% of respondents) generally reflected a "no conflict" segment (9 of the 11 variables). These individuals had not seen any of the human-dog behaviors and judged the behaviors as "not at all a problem."
>
> Individuals in the second cluster (14%) consistently expressed a "social values conflict." These individuals had not observed the behaviors but thought that the behaviors would be a problem if they were to occur.
>
> Cluster 3 (59% of respondents) reflected a combination of interpersonal and social values conflict (p. 20).

Respondents in the third cluster regarded the following behaviors to be problems even though they had not observed them: dogs causing wildlife to flee, dogs flushing birds, dogs jumping on visitors, and dogs pawing visitor and were categorized as social values conflict. The other seven dog related behaviors (e.g., uncollected dog waste, dogs approaching uninvited, dogs off trail) were both perceived as being problems and had been observed, thus categorized as goal interference conflicts (Vaske & Donnelly, 2007). The mix of observed and not observed confirmed their hunch that some conflict

experiences are characterized by both goal interference and a clash of values. Their methodology for typing conflict is well established (Carothers et al., 2001; Vaske et al., 1995; Vaske et al., 2007).

Gibson and Fix (2014) advanced the notion of "… 'latent-behavior conflict' to describe … a person [who] does not oppose an activity in general, but rather feels specific behaviors, which she or he [or they] personally did not encounter, are a problem" (p. 3). Their research was intended to test the idea that additional distinctions characterize social values conflict. They sought to "…identify recreational users that have a problem with a particular behavior but are not philosophically opposed to the presence of another user group because of differences in values and/or norms" (p. 7). Results from their study with motorized and non-motorized river recreationists warrant further examination of their theory. Though such exploration is beyond the scope of the current research, such a conflict type might explain trail visitors who are not opposed to visitors accompanied by dogs but who do find certain dog-related behaviors to be problematic regardless of whether they encounter them. This researcher, however, continues to assert that such classification is more about conflict sensitivity than it is about a distinct type of conflict.

The current research directly drew from Vaske and Donnelly's (2007) work which documented dog-related conflicts on nature trails while also providing a method by which to establish pre-existing perceptions of how problematic a set of dog-related behaviors would be, if they occurred. In this way, measuring tolerance for dog-related behaviors was construed as also measuring sensitivity toward conflict. Conflict potential herein, in contrast to sensitivity alone, additionally accounts for the likelihood of encountering the potential source of conflict. The current research therefore considered

problem level if the behavior were to occur (sensitivity) plus the likelihood that it will occur based on prior encounters in the setting (exposure) as an indicator of conflict potential. Unlike Vaske who assigned social values roots to conflicts void of encounters with the conflict source, the current research used historical observation levels in the setting as an indicator of the likelihood that the behavior will be encountered in the future. In the absence of measuring whether visit experience was affected negatively simply because of one's beliefs, the focus herein remained in the realm of conflict sensitivity and potential. In this way, the current research teased out potential for conflict from the occurrence of conflict.

Responses to recreation conflict. The expanded ORCM recognized outdoor recreation conflict as a process, after researchers studied responses to conflict (I. E. Schneider, 2000a, 2000b; I. E. Schneider & Hammitt, 1995; I. E. Schneider & Wynveen, 2015). Schneider & Hammitt (1995) argued for broadening the study of recreation conflict to include not only what happens before conflict and conflict as an outcome, but to also consider what happens after conflict occurs. They promoted a conflict-response framework rooted in a stress-response model. Their stated assumption was that outdoor recreation conflict (i.e., interference with achieving visit goals) produced stress. Quoting Monat and Lazarus, Schneider and Hammitt (1995) noted that "in conflict, frustration or threat of some sort is virtually inevitable … and is a major source of psychological stress …" (p. 226).

Schneider and Hammitt (1995) used the phenomenon of crowding, a then-popular example of a source of recreation conflict, to illustrate how responses to a conflict source can be characterized as coping. Schneider and colleagues relied theoretically on the

stress-response model developed by Lazarus and Folkman (as cited by Schneider & Hammitt, 1995). Essentially, the visitor who responds to stress by coping is responding to conflict by coping. According to Schneider and Hammitt (1995), responses to stress are influenced by personal and environmental factors, thus coping responses to perceived conflict are similarly so influenced. Consequently, it is reasonable to wonder whether antecedent conflict factors predict response to conflict as they are theorized to predict perceptions of conflict. Such speculation was indeed also posed by Schneider & Hammitt, the study of which lies outside the scope of the current research.

More recent examples of applying the adapted stress-response model to outdoor recreation conflict include: Miller and McCool (2003) who demonstrated a relationship between level of stress (presumably a reflection of conflict intensity) and type of response in recreational summer visitors to front-country areas in a national park; Oftedal, Kang, and Schneider (2015) who reported no differences in coping response between men and women engaged in hiking or cross country-skiing although men reported more instances of conflict than did women; and Schuster, Hammitt, and Moore (2006) who reported support for theoretical assertions that problem-focused coping and emotion-focused coping are not independent of each other but connected pieces of an overall coping strategy.

Responses to conflict in outdoor recreation settings have important management implications because those responses can affect both the natural and social environments. “Specifically, the logic is that as conflict induces stress, it can … incite coping which then changes the experience and may even result in substitution or displacement” (I.E. Schneider & Wynveen, 2015, p. 39. For example, visitors who avoid bringing their dog

to a trail known for the presence of many off-leash dogs are said to be coping through displacement, that is, they leave the area or perhaps they walk at odd hours to avoid the more popular times. That visitor may alternatively in the extreme choose to no longer walk on nature trails with their dog or perhaps they now walk with their dog on a trail where dogs rarely walk. Through a process of substitution, the visitor increases visitor use on a different protected area. While visitor satisfaction may increase on the new trail, reaching conservation goals may diminish through increased use. Land management strategies can be developed with an awareness of how a response to conflict may affect future experiences. And Schneider (2000b) further noted that "how conflict is managed determines its toxicity" (p. 130) and advised that scholars and practitioners recognize the positive opportunities that conflict in outdoor recreation might create, which is consistent with the tenets of conflict analysis and resolution in general (Hocker & Wilmot, 2014; Kriesberg & Dayton, 2012; Pruitt & Kim, 2004).

The focus herein is on that portion of the ORCM encompassing conflict sensitivity and its determinants. Antecedent conflict factors are thus next considered.

Antecedent Conflict Factors Applied to Dog Walkers

As others have noted, conflict between activity groups has been the dominant interest in outdoor recreation (e.g., Gage, 2015; Todd & Graefe, 1989; Usher & Gómez, 2017) and consequently studies of conflict within an activity group or between visitors and managers help to fill gaps in the literature. Understanding in-group variability may help land managers when deciding strategies for intervention. The current research focused on intra-group perceptions and self-reported behaviors by restricting participants to only those who walk with a dog on the local nature trails.

Existing research was used to provide insight into how behaviors and beliefs of those who walk with dogs can be categorized among some of the antecedent conflict factors used in the ORCM with the caveat that "… dog walking can never be the same experience as walking unaccompanied by a dog … [and] …pet dogs do not mean the same thing to everyone" (Degeling & Rock, 2012). While it may seem obvious that the activity of walking a trail with a dog is different from walking a trail without a dog, it may be less obvious to acknowledge that visitors to local trails who walk with a dog may experience it differently than do other visitors also walking with a dog. Exploring antecedent conflict factors of those who walk with dogs is thus justified as it will offer insight into how homogenous – or not – this group is when visiting local nature trails and perceiving potential conflict.

Activity style. Activity style can be understood as the personal meanings associated with a recreational activity; broadly considered, it encompasses motivations for participating in an activity, including reasons for visiting a natural site (Manning, 2011). Several studies have shown that some dog walkers feel an obligation or responsibility to care for their dogs through ensuring opportunities for their dogs to exercise (Cutt et al., 2008; Degeling & Rock, 2012; Edwards & Knight, 2006; Westgarth et al., 2014; K. J. H. Williams et al., 2009). Perhaps then, the antecedent conflict factor of activity style applied here as the motivation for the trail visit, indicates that the visit is more for the dog's benefit than it is for the dog walker's benefit. By extension, one can ask whether the dog walker who is acting from a place of obligation is similarly engaged in trail walking as the dog walker who is there to enjoy the natural setting and brought along their dog for companionship or who is on the trail primarily to get exercise.

Similarly, is the dog walker who keeps their dog leashed the entire visit engaged in trail walking in the same way as a trail visitor who lets their dog run freely throughout their visit? Different motivations and ways of engaging with an activity influence expectations for and understandings of what constitutes a positive visit experience. Jacob & Schreyer (1980) theorized that visitors who "…formulate and apply specific standards of what makes a quality experience are more sensitive to behaviors of [other] people *within as well as outside an activity*" (p. 373). Therefore, conflict sensitivity and potential is thought to be greater when expectations for positive experiences are rooted in differences in motivations for the visit (Jacob & Schreyer, 1980). In theory then, intra-activity conflict sensitivity and potential should be greater among visitors walking with dogs when their reasons for visiting the trail are different.

Resource specificity. The antecedent conflict factor of resource specificity reflects relationship between visitor and place. "A person well-acquainted with a recreation place has well-defined expectations about the variety and type of experiences to be found there" (Jacob & Schreyer, 1980, p. 374). The frequency with which a visitor engages with a place provides opportunity for developing such an acquaintance (e.g., Smaldone, 2006). Resource specificity as a contributor to conflict potential is relevant to the activity of walking with a dog on a local nature trail as suggested by prior research that described how dog walkers look for certain things in the places where they bring their dogs (Cutt et al., 2008; Degeling & Rock, 2012; Edwards & Knight, 2006; Lee et al., 2009). Such place attributes may include easy access to waste cleanup supplies such as bags and bins (e.g., Cutt et al., 2008; Edwards & Knight, 2006) or areas for off-leash time (e.g., Degeling & Rock, 2012) or opportunity for one's dog to socialize with other

dogs (e.g., Edwards & Knight, 2006) or for the dog walker to socialize with other dog walkers (e.g., Degeling & Rock, 2012) or to be in a wide-open green space (e.g., Cutt et al., 2008).

Such preferences may reflect an attachment to the resource and can be measured by assessing two dimensions of place attachment: place identity and place dependence (Kyle, Graefe, Manning, & Bacon, 2004; Price, Blacketer, & Brownlee, 2018; D. R. Williams & Roggenbuck, 1989; D. R. Williams & Vaske, 2003). Place "… attachment represents a positive connection or bond between a person and a particular place" (D. R. Williams & Vaske, 2003, p. 831). Place dependence as a functional attachment indicated the degree to which a person was dependent on the specific attributes of a particular place to realize their visit goals or to be able to engage in the activities of their choice; in contrast, place identity as an emotional attachment, "… refers to the symbolic importance of a place as a repository for emotions and relationships that give meaning and purpose to life" (D. R. Williams & Vaske, 2003, p. 831).

Differences in resource specificity so measured are theorized to contribute to the conflict experience when, for example, visitors who value a place see other visitors behaving in destructive ways and when visitors who feel a sense of possession encounter visitors behaving in ways that do not align with typical uses and established norms (Jacob & Schreyer, 1980). Despite the use of well-established scales for assessing distinct dimensions of place attachment (i.e., dependence and identity) (see D. R. Williams & Vaske, 2003), mixed results continue to characterize the findings regarding relationships between place attachment and perceptions of both the natural and social environment (Eder & Arnberger, 2012; Price et al., 2018). Its continued study is thus warranted.

Because place dependence decreased when "…visitors considered other places to be potential substitutes for the goals, activities, and experiences provided by the area" (White, Virden, & Riper, 2008, p. 652) it may not be useful to measure place dependence in situations where the individual can easily substitute one location for another and still meet their goals (such as when those seeking to walk with a dog on a local nature trail have ready accessibility to multiple nature trails). In contrast, place identity was associated with both greater sensitivity toward the behavior of others (e.g., Eder & Arnberger, 2012; Kyle et al., 2004) and with greater tolerance for recreational impacts (Price et al., 2018). Of the two, place identity is the more relevant measure of attachment for the current research. Not surprisingly, visit frequency has been shown to be related to place attachment (e.g., Colley & Craig, 2019; Tsaur et al., 2014) and to place identity, in particular (e.g., Backlund & Williams, 2004; Budruk et al., 2008). Both attachment and visit frequency reflect relationship with a natural setting and herein serve as measures of resource specificity.

Mode of experience. The way in which a visitor focuses on a setting or activity reflects their mode of experience (Jacob & Schreyer, 1980). Different dog walkers may attend to different things during a trail visit. Some may be focused on being outdoors and in a natural setting, while others may be focused on the chore of walking their dog; and others may be focused on the joy of walking the dog (e.g., Westgarth et al., 2014) or more focused on the social component when other dog walkers are present (e.g., Degeling & Rock, 2012; Edwards & Knight, 2006). In these ways, mode of experience may vary among those walking their dogs and contribute to perceptions of conflict when visitors focused on one thing (e.g., nature) encounter visitors focused on something else

(e.g., their dogs or the people they are with) (Jacob & Schreyer, 1980). Herein mode of experience was not operationalized in deference to survey length and the idea that it was hinted at when participants ranked possible options for their most important reason for visiting a local nature trail with a dog, herein a measure of the antecedent conflict factor of activity style.

Lifestyle tolerance. As a construct in the ORCM, lifestyle tolerance serves as a reflection of a visitor's inclination to accept or reject behaviors or beliefs (i.e., lifestyles) different from those of the visitor (Jacob & Schreyer, 1980). On nature trails that welcome dogs, lifestyle tolerance can be thought to encompass beliefs about acceptable behaviors when walking with a dog. There is evidence that 'in' and 'out' groups within dog walkers can develop based on dog-waste collection practices; those who clean up belong in the 'in' group and engender positive attitudes while those who do not are viewed as outsiders and engender negative attitudes (Edwards & Knight, 2006).

Furthermore, perceptions of dog owners as having a social responsibility to care for and clean up after their dogs exist (Cutt et al., 2008). Public portrayals of dog walkers as a group were shown to accentuate the negative in describing dog walkers as ignoring others in public spaces, being intolerant of others' views, and as being entitled to special areas for their dogs in the public sphere (Toohey & Rock, 2015). Having a dog 'under control' means different things to different dog walkers; some think it means a dog must be on a leash, while others believe 'voice control' adequately satisfies a requirement to have their dog 'under control' (Edwards & Knight, 2006). (Definitions across policies intended to guide dog walking behaviors can also similarly vary.) A sense of obligation to leash one's dog was associated with the belief that others expected dogs to be leashed

(K. J. H. Williams et al., 2009). The ORCM theorizes that those with greater tolerance of behavior different from their own will perceive less conflict (Jacob & Schreyer, 1980; Vaske, Donnelly, Wittmann & Laidlaw, 1995) and as was shown by Thapa and Graefe (2004) who reported that visitors with higher tolerance levels experienced less conflict.

Recreation Conflict and the Conflict Generalist

Conflict is admittedly thought about in different ways (Tidwell, 1998), so it is important to articulate how conflict is being conceptualized when it is a topic of interest. With an interest in applying principles of the conflict specialty to other specialties in general, and to environmentally-related disciplines in particular, outdoor recreation conflict theory will now be considered through the lens of a conflict generalist.

Defining Conflict

For those generally interested in conflict, it is worth noting that Jacob & Schreyer's (1980) goal-interference attributed to other definition of conflict is consistent with, though narrower than, generally accepted conflict definitions from the field of conflict resolution studies. One commonly accepted, broad definition of conflict is "… the opposition between individuals and groups on the basis of competing interests, different identities, and/or differing attitudes" (Schellenberg, 1996, p. 8). Consistent with this broad definition is another: the "…perceived divergence of interest – a perception by one of the parties … that its aspirations are incompatible with those of the other party…" (Pruitt & Kim, 2004, p. 13). A narrower and quite detailed definition of conflict is an "…expressed struggle between at least two interdependent parties who perceive incompatible goals, scarce resources, and interference from others in achieving their goals" (Hocker & Wilmot, 2014, p. 13). This third definition requires that both parties

connected to the conflict must perceive it. In contrast, others argued that a conflict can exist if only one party perceives the opposition or struggle (Mayer, 2012; Tidwell, 1998). Mayer, a conflict practitioner and scholar, explained,

> As a practical matter I find it useful to assume that a conflict exists if at least one person thinks that there is a conflict. If I believe that we have incompatible interests and proceed accordingly, I am engaging you in a conflict process whether you share this perception or not. (p. 5)

Mayer's stance is compatible with observations in outdoor recreation that one user group might be upset by the actions of another, while the reverse is not true (two examples of such conflict in outdoor recreation were Ivy et al., 1992; Mann & Absher, 2008). Although Jacob and Schreyer (1980) asserted that conflict can exist when only one party perceives it, they underscored that "an individual must be willing to make the link between goal interference and another person's behavior for a conflict to exist" (p. 369). Unmet visit goals due to factors such as undesirable weather for example would not constitute an experience of conflict. They further asserted that goal interference is a subjective state

> that must be understood as an individual's interpretation and evaluation of past and future social contacts. Social contact, defined as knowledge of another's behavior, is a necessary condition of conflict. Contact can be direct – meeting someone face to face – or indirect, such as seeing a tent on the other side of the lake. (p. 369)

Their acknowledgement of the role of individual meaning-making and the need for social contact are consistent with aspects of Hocker & Wilmot's (2014) definition of conflict as

a phenomenon that includes the subjective perceptions of interdependent parties to the conflict; the two admittedly diverge given that Hocker & Wilmot require that both parties recognize the conflict and Jacob & Schreyer (1980) do not.

Finally, the development of a social values model of outdoor recreation conflict (Vaske et al, 1995) to complement the goal interference model (Jacob & Schreyer, 1980) of outdoor recreation conflict further suggests the compatibility of outdoor recreation conflict theory with the tenets of general conflict theory which distinguishes between conflicts of resources and conflicts of values (e.g., Pruitt & Kim, 2004).

Conflict Analysis and Resolution

Conflict management is a multi-faceted phenomenon requiring an awareness of what conflict is, factors that influence it, and methods that change it. Synthesizing the work of many, Cheldelin, Druckman and Fast (2008) offer a generic and comprehensive framework from which to approach any conflict, from analysis through intervention. It serves as a reminder that during analysis types, sources, and dynamics ought to be identified and as importantly influences and contexts also should be identified and finally interventions considered. Cheldelin et al assert that interventions must be tailored to the conflict and that they may change over the course of the conflict. In this sense, the ORCM is admittedly incomplete lacking assessment of contexts and influences as well as proposals for intervention.

While retaining the theoretical suppositions of the expanded ORCM, however, the analysis of outdoor recreation conflict could easily adapt a general conflict resolution model, for example the Resources and Values Model, as described by Katz, Lawyer, and Sweedler (2011, see pp. 115-122). Stage One acknowledges the perception of conflict;

an outdoor recreation adaptation would include also recognizing conflict when experienced unilaterally.

Stage Two clarifies the source of the conflict by categorizing it as one of needs (resources) or values. Generally, a conflict characterized by mutually exclusive goals, by desire for limited resources, or by engaging in different methods to reach the same goals would be categorized as a resource conflict (Katz et al., 2011). In contrast, a conflict characterized by different perceptions of how things should be (values) or how things are (beliefs) or what things should be liked (preferences) would be categorized as a values conflict (Katz et al., 2011). In outdoor recreation, the goals of visitors to have positive visit experiences are understood as needs met through the use of the finite natural setting, while social values are similarly considered as reflections of beliefs, values and preferences. It is possible for some conflicts to exhibit elements of each type (Katz et al, 2011). In outdoor recreation conflict theory, this possibility is acknowledged in the evolved social values model which specifically addresses the possibility that conflict can be experienced in such multifaceted ways (see Gibson & Fix, 2014; Vaske et al., 2007).

Stage Three of the Resources and Values Conflict Resolution Model relies on having accurately determined the source and type of conflict so that the more appropriate conflict reduction strategy can be applied (Katz et al., 2011). As previously discussed, Vaske and colleagues (Carothers et al., 2001; Vaske et al., 1995; Vaske et al., 2007) similarly highlighted the importance of identifying the root cause (goal interference/interpersonal versus social values) of an outdoor recreation conflict because of the implications for land management as conflict management.

Stage Four of the model employs a general problem-solving process (see Katz et al., 2011, pp. 35-40) that can be used with both resource and values conflicts; the intent is "… to uncover a course of action that will satisfy the principal interests of all parties to a conflict and completely resolve the conflict situation" (p. 118). While the Katz et al (2011) model is geared toward communication between two individuals in conflict, the typical strategies for managing outdoor recreation conflict between groups reflect the underlying tenets of the problem-solving process. Often outdoor recreation conflict is managed through zoning (i.e., keeping visitors engaged in different activities away from each other) and/or educational efforts (see Manning, 2011, pp. 217-218). The former is an example of providing access to resources that allow conflicting groups of visitors (or users of the natural resource) to separately meet their visit goals without interference; while educational efforts may "… establish a basic etiquette, code of conduct, or other behavioral norms that might lessen …conflict" (p. 218); educational efforts may also lead to increased tolerance for those involved in different activities by explaining the reasons for certain behaviors or by emphasizing similarities between different visitor groups (Manning, 2011; Ivy et al., 1992; Ramthun 1995).

Conflict Can Be Constructive

While the focus has thus far been on the negative impacts of noncomplying behavior (leaving dog waste on the ground and letting dogs run off leash), it is widely recognized in the conflict resolution field that conflict in and of itself is value neutral (e.g., Kriesberg & Dayton, 2012). Whether or not a conflict produces constructive or destructive outcomes depends on how the parties involved respond to each other's behavior (Hocker & Wilmot, 2014; Kriesberg & Dayton, 2012; Pruitt & Kim, 2004).

Worth noting, in the field of outdoor recreation, Schneider (2000b) made the case for acknowledging that conflict may create constructive opportunities and that management's response can help or hinder the conflict depending on how well-matched the conflict management strategy is to the conflict. With regard to managing dogs in public spaces to prevent conflict, some efforts brought municipal officials, land managers, pet organizations and volunteers together to collaboratively brainstorm and implement management strategies thus strengthening community while working to protect natural and social environments (e.g., Dolesh, 2018).

Enhancing Compliance to Prevent Conflict

Policy noncompliance can create conflict in the outdoor recreation setting between trail visitors and trail managers, as well as between trail visitors. Assuming policies are developed with input from all relevant stakeholders, optimizing compliance should minimize conflict potential and foster an atmosphere conducive for the activity of interest, be it conservation or recreation oriented. But how best to enhance compliance? Sometimes the use of persuasive messages is effective in changing public behavior (e.g., Goldstein, Martin, & Cialdini, 2008). Developing an effective persuasive communication campaign to promote policy compliance requires knowledge of the target audience and their attitudes and experiences (Bator & Cialdini, 2000; Goldstein et al., 2008; Roggenbuck, 1992). In outdoor recreation, a persuasive campaign developed by land managers would fall under the umbrella of education-related interventions to manage conflict. For example, by describing their target audience (i.e., trail visitors walking with dogs who do not comply with policies) and understanding their attitudes (e.g., tolerance of dog-related behaviors, motivation for trail visit, and relationship with the trail) and

experiences (e.g., stepping in uncollected dog waste or being charged at by an off-leash dog), land managers' actions are not only consistent with general conflict resolution practices that seek input from both parties, but are better positioned for developing an effective persuasive message.

A theoretical framework was needed herein to guide collection of the elements for an effective strategy for delivering a persuasive message that would promote policy compliance and thereby prevent conflict. The Health Belief Model was chosen for this purpose for three distinct reasons: its underlying premise: "if persuasive methods can be used to change behaviour-related beliefs and these interventions also result in *behaviour change* [emphasis added] this provides a theoretical and practical basis for evidence-based … education" (Abraham & Sheeran, 2005, p. 28); it was well established and oft explored (e.g., Champion & Skinner, 2008); and it was used in an exploratory study of dog waste management (Typhina & Yan, 2014).

Behavior Change and The Health Belief Model

The Health Belief Model (HBM) is a psychosocial framework used to describe decision making by an individual as it relates to health-related behavior (Champion & Skinner, 2008; Rosenstock, 1974). The conceptual accessibility of the HBM makes it attractive across disciplines (Abraham & Sheeran, 2005, 2007) and is reflected in this concise summary statement of the HBM premise:

> If individuals regard themselves as susceptible to a condition, believe that condition would have potentially serious consequences, believe that a course of action available to them would be beneficial in reducing either their susceptibility to or severity of the condition, and believe the anticipated benefits of taking action

> outweigh the barriers to (or costs of) action, they are likely to take action that they believe will reduce their risks. (Champion & Skinner, 2008, p. 47)

Working in the public health realm in the 1950s and 1960s, social psychologists were trying to understand and predict health prevention behaviors (Rosenstock, 1974). They wanted to understand why more people were not taking advantage of vaccinations (against tuberculosis for example) or screening tests when asymptomatic. They built on each other's work out of necessity because applied social science in public health was then in its infancy (Rosenstock, 1974). The cooperative atmosphere was perhaps further boosted by their shared worldview as informed by the field theory work of Kurt Lewin (as cited by Rosenstock, 1974), rather than by another then-popular perspective: a stimulus-response orientation toward explaining and understanding behavior (Champion & Skinner, 2008).

As Rosenstock (1974) explained their shared worldview accepted that "… it is the world of the perceiver … that determines what he[/she/they] will do and not the physical environment, except as the physical environment comes to be represented in the mind of the behaving individual" (p. 329). The subjective determinants of behavior were encoded in the value expectancy underpinnings of the HBM (Champion & Skinner, 2008; Rosenstock et al., 1988). As explained by Rosenstock et al., "… behavior is a function of the subjective value of an outcome and of the subjective probability (or "expectation") that a particular action will achieve that outcome" (p. 176). When applied to health-related behavior, it was assumed that people gave value to not getting sick (or value to getting better if they were already sick) and that some specific behavior, if performed, would prevent getting sick (or help with getting well) (Champion & Skinner, 2008). The

HBM accounted for other factors that impacted expectations: the saliency of threat, that is, the person's view of their vulnerability to getting sick and how severe the illness would be if they got sick, as well as that person's perceptions of how effective a particular preventive behavior would be if they performed it (Champion & Skinner, 2008; Rosenstock, et al., 1988).

The HBM Constructs

As illustrated in Figure 2 (Champion & Skinner, 2008) (See page 12 herein), the value expectancy decision process described by HBM theory includes constructs that can be grouped as modifying factors, beliefs of individuals, and actions. Action is more likely to occur in the presence of a trigger to act, if the individual believes performance of the recommended behavior will alleviate threat with a benefit that outweighs the costs of performing the behavior; those beliefs are influenced by pre-existing modifying factors. Potential modifying factors included variables such as age, gender, ethnicity, socioeconomic status, personality attributes, and knowledge.

Unless otherwise stated, this descriptive list of the elemental constructs of the model was adapted from Champion and Skinner (2008). Perceived susceptibility: beliefs about the likelihood of experiencing a negative consequence by not performing the recommended behavior; perceived severity/seriousness: beliefs and feelings about the degree of harm the negative consequences will cause; beliefs and feelings can relate to consequences for one's self or consequences to one's social world (also Rosenstock, 1974); perceived benefits: beliefs about how effective the recommended action will be at reducing threat (susceptibility and seriousness); the positive consequences of performing the behavior; perceived barriers: beliefs about the costs of performing the recommended

behavior or costs of removing impediments to performing the behavior. (Cost can be tangible or psychological for example, cost can be "…inconvenient, expensive, unpleasant, painful, or upsetting" (Rosenstock, 1974, p. 331).); self-efficacy: beliefs about one's capability to perform the desired behavior. It was implicitly included in the model from the start when considered as a barrier (Janz & Becker, 1984; Rosenstock, et al., 1988) but subsequently explicitly included in the model after an overlap between HBM and social cognitive theory (see Bandura, 1977) was acknowledged (Rosenstock, et al., 1988).

Finally, cues to action or reminders were intended to be those things or people that prompted the performance of the recommended behavior; they can be intentional reminders or subtle nudges; they can be internal (personal experience, self-awareness) or external (messages in the media, promotional materials) (Champion & Skinner, 2008; Rosenstock, 1974).

HBM Modifying Factors

As Abraham & Sheeran (2007) noted, considering the modifying factors as prerequisites of behavior is an important theoretical element of the HBM; psychosocial variables have the potential to be changed whereas demographic ones do not. The logic that follows is if psychosocial variables can be altered, then perceptions of the constructs in the expectancy-value equation may change and in so doing be associated with behavior change. Early HBM theorists acknowledged a role for modifying factors when noting that "perceived susceptibility and severity having a strong cognitive component are at least partly dependent on knowledge" (Rosenstock, 1974, p. 331) and they further expected their initial model to be expanded and refined by the findings of both scholars and

practitioners (Rosenstock & Kirscht, 1974). Health motivation as a behavioral incentive was posited as a factor in determining health-related behavior (Champion, 1984; Rosenstock, 1974) but inconsistently included - as were other modifying factors - in explorations of the HBM to explain health related behavior (Carpenter, 2010).

Reviewing the HBM

Early reviews of HBM literature (Harrison, Mullen, & Green, 1992; Janz & Becker, 1984) pointed to the general lack of consistency in operationalizing the model (C. J. Carpenter, 2010), ranging from definitions of the constructs to which constructs were measured to how they were measured. Instrument development often lacked formal assessment of validity and reliability. A notable exception was the exemplary work of Champion beginning with her demonstration of how to construct an HBM-based instrument (Champion, 1984). Self-efficacy and cues to action were infrequently included in studies of the HBM (C. J. Carpenter, 2010; Rosenstock, 1974).

Differences in operationalizing the HBM make it difficult to compare research results across studies; but lessons can be learned. On occasion, the constructs of susceptibility and threat were assessed in combination under the ‘threat’ label (see Abraham & Sheeran, 2007). Such an approach was criticized as violating the value-expectancy structure of the HBM (Feather as cited by Abraham & Sheeran, 2007). The relationship between susceptibility and severity was eventually described as not being additive; severity was reported to be influential to a certain point then susceptibility became the better predictor (Champion & Skinner, 2008; Weinstein cited by Abraham & Sheeran, 2007). Coincidentally the need for both severity and susceptibility is reflected in

the definition of conflict potential developed herein: sensitivity (severity) + exposure history (susceptibility) = conflict potential (threat).

The four original constructs: susceptibility, seriousness, benefits and barriers were historically studied as individual predictors, often predicting outcome but their individual effects were often small (e.g., Abraham & Sheeran, 2007; Carpenter, 2010). It was more typical than not for barriers to emerge as the strongest predictor of behavior (see Abraham & Sheeran, 2005, 2007; Champion & Skinner, 2008). Ultimately, it was suggested by several that the HBM constructs should be evaluated in concert with each other for the model to retain its utility to describe and predict behavior (Abraham & Sheeran, 2007; C. J. Carpenter, 2010; Champion & Skinner, 2008; Jones et al., 2015). Studies in which the variables were examined for more complex relationships suggested the continued use of the HBM worthwhile (e.g., Cook, 2018; Jones et al., 2015).

Finally, as recently as 2017 it was argued that evidence from experimental approaches (i.e., not just correlational) to evaluate theoretical applications in behavior change (such as those involving applications of HBM) are sorely needed (Sheeran, Klein, & Rothman, 2017). It is this researcher's belief, that such a need reflects past unavailability of resources (e.g., time, money, personnel, and access to relevant participants) more than it reflects a lack of awareness by scholar-practitioners. Testing theory in controlled fashion consistent with a postpositivist view of the advancement of knowledge is no easy undertaking. Sheeran et al merely point out the obvious, but in so doing, they underscore the merits of shifting management priorities to better position the scholar-practitioner community to utilize experimental methods.

The HBM Applied to Environmental Concerns

Parallels between health and environmental behaviors have been described (Lindsay & Strathman, 1997; Nisbet & Gick, 2008; Straub & Leahy, 2014) and suggest the appropriateness of applying the HBM to environmentally related behaviors. A handful of studies have used the HBM framework to one degree or another to explain varied pro-environmental behavior and/or attitudes: recycling behavior (Lindsay & Strathman, 1997), well-water testing (Straub & Leahy, 2014), residential water saving (Morowatisharifabad et al., 2012), attitudes toward green advertising (Yoon & Kim, 2016) and dog waste collection (Typhina, 2011; Typhina & Yan, 2014). The HBM helped to explain outcome behavior in these studies; across studies, most notably, perceived barrier(s) was a significant predictor in each. Applying the HBM to the development of a dog waste management campaign is most relevant herein and thus a detailed account of Typhina & Yan's research is next described.

The HBM and a dog waste management campaign. With an objective to identify a persuasive message to increase dog waste collection and to identify how best to communicate it to dog owners, Typhina & Yan (2014) surveyed dog owners to identify the representative negative consequence (i.e., threat) of not cleaning up after a dog, the representative benefit of cleaning up, the representative barrier(s) to cleaning up and the representative triggers to remember to clean up (i.e., cue to action). In this way the authors applied the Health Belief Model (HBM), as they examined the relationships between these representative indicators of the HBM constructs and self-reported dog-waste collection practices in different settings: on a public street and on a greenway trail.

All dog owners in the city of Pullman, Washington were invited via messages posted in pet stores, conveyed in news media articles, and included in mailings of utility bills to participate in an online survey about pet waste (Typhina & Yan, 2014); a sample size of 455 was thus generated. When designing their survey instrument, Typhina & Yan relied on reports from pet waste surveys in comparable cities as they created checklists of indicators for each construct; in an effort to increase the survey's validity, they subsequently sought the expert judgement of colleagues, city staff, and dog owners.

Typhina & Yan (2014) identified the representative indicators of the HBM constructs by conducting a chi-square goodness of fit analysis for each construct. Results indicated that the representative threat was "failing to be courteous to others" (p. 77); the representative benefit was "not to step in it" (p. 77); the representative barrier was "lack of resources (bags and bins availability)" (p. 77). The frequencies of representative benefit and barrier were consistent with the previous findings upon which Typhina & Yan relied when designing the survey instrument. As cues to action, representative messenger was police officer and representative reminders were "…portable bag dispenser …, bag availability …, and reminder signs around town …" (p. 78). According to Typhina & Yan, these reminders as representative cues contrast with previous findings that had indicated "… traditional media (i.e., television, radio, newspaper, etc.) as the best cue to dog waste collection" (p. 80).

The use of the HBM by Typhina and Yan (2014) was creative in two ways. First, as they described, the HBM had not been previously applied to dog waste collection behavior. They were seeking a theory-based approach to inform a dog waste management campaign, framing dog waste collection as a pro-environment behavior that would help

diminish stormwater pollution (p. 73). In this way, their research added to the body of knowledge on HBM applied to pro-environment behavior instead of a pro-health behavior. Curiously though, Typhina and Yan did not report participants' perceptions of pro-environment behavior or attitudes.

Secondly, the purpose of their HBM instrument was to identify a single example of each construct as the representative example of that construct. This design feature veered from the Likert-item scales that were typically used to measure HBM constructs (e.g., Champion, 1984) and that were used by others who applied the HBM to environmentally-related behavior ((Lindsay & Strathman, 1997; Morowatisharifabad et al., 2012; Straub & Leahy, 2014). As designed, Typhina & Yan (2014) sought only the best reason, according to the participant, for performing the behavior of cleaning up after one's dog. As Typhina (2011) admitted, the use of an instrument whose validity and reliability were not assessed is a limitation of the study.

Once the representative indicators for each of the HBM constructs were described the relationship between the representative indicator of the construct and self-reported dog waste collection behaviors were examined individually. Typhina & Yan (2014) hypothesized that correlations between representative indicators and dog waste collection would be positive, except for the representative indicator for barrier which would be negatively correlated (i.e., as barrier increases, dog waste collection decreases). Directional hypotheses were the same regardless of setting, street or trail.

The researchers reported that the threat of failing to be courteous to others was positively correlated with waste collection for street and trail. The benefit of not stepping in the waste correlated significantly as predicted only with behavior in a trail setting and

not in a street setting. Barriers to picking up (e.g., having no bag or bin) were negatively correlated only with clean up behavior on streets and not at all with trail behavior. The representative indicator for messenger (i.e., the person who would be most persuasive in delivering a message) did not significantly correlate with clean up behavior. In a street setting, the representative indicators of portable bag dispenser and signs around town as reminders to act did not significantly correlate with waste cleanup behavior; bag availability (i.e., convenient bags) did however significantly and positively correlate with clean up behavior in a street setting. In a trail setting, both portable bag dispenser and signs around town correlated positively and significantly with waste cleanup behavior; bag availability as a reminder did not correlate significantly with waste cleanup behavior in a trail setting.

Based on these findings, Typhina and Yan (2014) proposed different communication strategies depending on the setting (street or trail). "Ultimately, the results point to the need to tailor messages depending on the location, include calls to the appropriate social norms, and simply provide the resources needed to collect and dispose of pet's waste" (p. 81).

Given that Typhina & Yan (2014) were the first to use the HBM with dog waste collection behavior, it is worthwhile to further investigate the use of the HBM in developing a persuasive message with regard to increasing dog-waste collection behavior. Thus inspired, the current study similarly explored identifying representative indicators of HBM constructs for dog-waste collection behavior in dog walkers; in contrast to Typhina & Yan, the setting herein was restricted to nature trails in central Massachusetts communities. Because the setting herein was limited to local nature trails,

the checklist of indicators for each construct was reviewed and edited for applicability to trail behavior. Additionally, the possible indicators for ‘cue to action: messenger’ were revised to a list of people a trail visitor might encounter, especially since Typhina and Yan reported no correlation between their representative indicator and dog-waste cleanup behavior.

Typhina & Yan (2014) obtained dog waste collection behavior by asking participants to report what they did ‘most of the time’ by indicating that they pick up or that they leave it on the ground. Herein, participants were asked to respond to two Likert-type questions: how often did they pick up their dog’s waste and how often did they leave bagged dog waste on the ground. Use of Likert-type questions rather than those providing dichotomous responses was intended to provide greater descriptive detail and potentially greater flexibility during analysis (e.g., Gracyalny, 2017).

ORCM and HBM: Dog Management as Conflict Management

The ORCM has been used to understand and predict conflict among different recreational users of the outdoors as well as used to inform resource management practices; whereas the HBM has been used primarily to understand and predict health-related behavior as well as used to inform communications regarding the benefits of health-related behavior that prevents illness or reduces the effects of an illness. In both models, the respective theoretical framework acknowledges the influence of pre-existing psychosocial factors (antecedent conflict factors in the ORCM and modifying factors in the HBM). Figure 3 (See page 17) visually depicts the role of antecedent conflict factors in the ORCM (Jacob & Shreyer, 1980; Manning, 2011) as modifying factors in an HBM framework. The antecedent conflict factors of the ORCM are shown in italicized, bold

type in Figure 3. The figure also illustrates the position of sensitivity (which is an ingredient of conflict potential).The two frameworks can be linked first by examining whether antecedent conflict factors are related to HBM constructs of threat, benefits, and barriers; then further linked by examining whether the relationships between HBM constructs and conflict prevention behavior (i.e., dog-waste collection) are related to level of antecedent conflict factor or conflict potential.

With its focus on prevention, the HBM is an attractive theoretical framework from which to develop a conflict prevention communication strategy. In the case of behavior associated with dog presence as a source of conflict, the aim becomes increasing the performance of behavior that reduces or eliminates the conflict source. To better understand the factors modifying perceptions of threats, benefits, barriers and cues to act as they relate to picking up dog waste and putting it in the trash, the antecedent factors of the ORCM as well as conflict potential proposed herein are theoretically worthwhile candidates. And while the ORCM is well suited to characterizing conflict, pairing it with the HBM may provide a tool that speaks directly to how best to draft and communicate a conflict prevention message intended to protect the natural and social environments.

Chapter Summary

The competing goals of land conservation and outdoor recreation were described in the context of seeking compliance with policies intended to serve both sets of goals. Minimizing the impacts of visitors to natural settings will help to preserve the setting and the opportunity to visit it. The extra trail management challenges associated with allowing dogs to accompany trail visitors were described and categorized as those that impact the natural setting and those that impact the social environment. Behavior related

to dog presence was positioned within the outdoor recreation conflict model (ORCM) as a potential source of conflict. The use of a well-documented public health value expectancy decision theory (Health Belief Model, HBM) was justified as the frame for developing a persuasive message intended to increase dog waste collection on local nature trails, as a conflict prevention behavior. An argument was made for integrating the ORCM with the HBM by questioning whether relationships between HBM factors and dog waste collection behavior vary as a function of level of antecedent conflict factor or conflict potential.

Chapter 3: Research Methods

Chapter 3 provides a restatement of the purpose of the current research by describing four objectives of the research and associated null and alternative hypotheses within each objective. The postpositivist philosophical worldview (Creswell & Creswell, 2018) underlying the research herein and how it impacts methodology is then discussed. The chapter progresses with identification of the selected research design and describes the participants and sampling method used. Measuring instruments are identified and examples provided; research procedures and plans for analysis are outlined. Finally, the chapter addresses relevant ethical issues.

Statement of Purpose

The overarching purpose of this cross-sectional survey study was to examine the potential for added-value when pairing an outdoor recreation theory of conflict with a theory of health promotion in order to increase behaviors consistent with policies meant to protect the natural environment and the social environment in that natural setting. Elements in the ORCM (conflict potential and antecedent conflict factors) were tested for relationship with leash use during a trail visit and with dog-waste collection behaviors; the HBM was similarly applied and tested for relationship between representative indicators of HBM factors and dog-waste collection. Relationships between the ORCM antecedent conflict variables and those of the HBM factors were explored. Finally, using the aforementioned elements from the ORCM as stratifying variables the relationships between HBM factors and dog-waste collection were examined. Dog management practices were measured through self-reports of duration of leash use during a trail visit, of collecting dog waste and of leaving bagged dog waste on the ground. With a focus on

developing a theory-based message intended to increase dog-waste collection and disposal as a conflict prevention strategy, the current research had four objectives, as follows.

Research Objective One

The first aim of the current research was to describe, from within a conflict framework, dog walker perceptions and behavior when walking on a local nature trail. ORCM theory was applied by describing antecedent conflict factors and perceptions of conflict potential associated with dog-related interactions. Three of the four original antecedent conflict factors proposed by Jacob & Schreyer (1980) were assessed: activity style (measured as visit motivation through assessment of the most important reason for the trail visit; modeled after several and rooted in the work of Driver and colleagues – see Manning, 2011), resource specificity (measured as visit frequency; and as place identity which is a dimension of place attachment and modeled after Kyle, Graefe, Manning & Bacon 2004; Price, Blacketer, & Brownlee, 2018; Williams & Vaske, 2003), and lifestyle tolerance (measured as perceptions of human-dog interactions as problems and modeled after Vaske & Donnelly, 2007).

Measurement of conflict potential was consistent with an adaptation (Hidalgo & Harshaw, 2010) of methods to categorize outdoor recreation conflict established by others (Vaske & Donnelly, 2007; Vaske et al., 2007). Conflict potential was comprised of perceptions of human-dog interactions as problem behaviors (sensitivity) combined with reports of whether the dog-related interactions had ever been observed during past trail visits (exposure). This approach allowed the researcher to identify conflict potential and categorize it as non-existent/minimal, triggered sensitivity (problem plus exposure),

or as non-triggered sensitivity (problem plus no exposure). It was tempting to use conventional conflict-typology labelling (no conflict, goal interference conflict and/or social values conflict) (e.g., Carothers, et al., 2001; Gibson & Fix, 2014; Vaske, et al., 2007; Vaske, et al., 1995) to distinguish within conflict potential. Novel labelling was adopted in deference to the absence of a conflict measure herein and to a reluctance to label as a 'conflict rooted in social values' that situation in which a visitor believes that if a certain interaction were to occur it would be an extreme problem but the visitor never or rarely encounters the interaction. Without asking the participant whether their goals for the visit were affected by holding that perception, it is impossible to know whether conflict potential moved to an experience of conflict.

ORCM theory was tested by exploring the relationship between each antecedent conflict factor and dog-management practices of leash use and of dog-waste collection. Hypotheses for testing antecedent conflict factors and dog leashing practices were:

$H1_0$: Each antecedent conflict factor is unrelated to dog leashing practices.

$H1.1_a$: Visit motivation is related to dog leashing practices.

$H1.2_a$: Visit frequency is related to dog leashing practices.

$H1.2.1_a$: Place identity is related to dog leashing practices.

$H1.3_a$: Tolerance of dog-related behaviors is related to dog leashing practices

Hypotheses for dog-waste collection were:

$H2_0$: Each antecedent conflict factor is unrelated to dog-waste collection.

$H2.1_a$: Visit motivation is related to dog-waste collection.

$H2.2_a$: Visit frequency is related to dog-waste collection.

$H2.2.1_a$: Place identity is related to dog-waste collection.

$H2.3_a$: Tolerance for human-dog interactions is related to dog waste-management.

Research Objective Two

The second aim of the current research was to explore, in similar fashion to Typhina & Yan (2014), the utility of HBM theory serving as a framework for developing a persuasive message and prevention strategy. HBM theory was applied to the conflict-prevention behavior of dog-waste collection and disposal by identifying representative indicators for the core HBM constructs of threats, benefits, barriers and cues to act (modeled after Typhina, 2011; Typhina & Yan, 2014). HBM theory was tested by exploring the relationship between representative indicators of the HBM constructs as independent variables and self-reported dog-waste-management practices as dependent variables (modeled after Typhina, 2011; Typhina & Yan, 2014). The resulting null hypothesis and corresponding alternative hypotheses were:

$H3_0$: Each representative indicator of the HBM constructs is unrelated to dog waste collection.

$H3.1_a$: Threat is related to dog-waste collection behavior

$H3.2_a$: Benefit is related to dog-waste collection behavior

$H3.3_a$: Barrier is related to dog-waste collection behavior

$H3.4_a$: Cue to Act-Messenger is related to dog-waste collection behavior.

$H3.5_a$ Cue to Act-Media is related to dog-waste collection behavior.

Research Objective Three

The third aim of the current study was to test for relationship between ORCM antecedent conflict factors and the representative indicators of the HBM factors for the conflict-prevention behavior of dog-waste collection. This was done as a prelude to

integrating the two theories analytically. The resulting null hypothesis and corresponding alternative hypotheses were:

$H4_0$: Each antecedent conflict factor is unrelated to the representative indicator of the HBM factors (threat, benefit, barrier, messenger, and media) for the conflict-prevention behavior of dog waste collection and disposal.

$H4.1_a$: Lifestyle tolerance, as measured through tolerance for human-dog interactions, is

related to the representative indicators of the HBM factors.

$H4.2_a$: Activity style as measured through main reason for trail visit is related to the representative indicators of the HBM factors.

$H4.3_a$: Resource specificity as visit frequency is related to the representative indicators of the HBM constructs.

$H4.3.1_{a:}$ Resource specificity as place identity is related to the representative indicators of the HBM constructs.

Research Objective Four

Finally, the current research aimed to explore integrating elements of the ORCM into the HBM framework for the task of developing a persuasive message to increase the collection of dog waste when on local trails. For this purpose, only threat, benefit and barrier from the HBM were considered in tests of association with dog-waste collection. As ORCM elements, antecedent conflict factor as well as conflict potential, were positioned as stratifying variables resulting in the following hypotheses:

$H5_0$: Relationship between representative indicators of HBMs and dog-waste collection does not vary as level of ORCM element varies.

$H5.1_a$: Relationship between representative indicator of HBM threat and dog-waste collection varies as level of ORCM element varies.

$H5.2_a$: Relationship between representative indicator of HBM benefit and dog-waste collection varies as level of ORCM element varies.

$H5.3_a$: Relationship between representative indicator of HBM barrier and dog-waste collection varies as level of ORCM element varies.

Participants were people who visited nature trails with their dog in 2019; local nature trails were in one of two towns in central Massachusetts. Non-probabilistic sampling methods were used. Participants were recruited on-site at the trails or recruited through flier postings in public spaces or electronically communicated. Recruitment culminated in sharing the link to the online survey. Quantitative descriptive data were collected via participant-completed survey online (or via pen-and-paper with return by United States postal service if requested by a potential respondent.) Tests of association were conducted to explore relationships between variables; nonparametric techniques were used to analyze the categorical data.

A Quantitative Research Paradigm

The philosophical assumptions underlying a research endeavor merit articulation because they reflect how the researcher: views reality (ontological), recognizes knowledge of that reality (epistemological), espouses their role in the research (axiological), and approaches the investigatory process (methodological) (Creswell, 2013). Collectively these assumptions indicate the paradigm that serves as the framework within which the researcher works. In this sense, a paradigm can be thought of as "… a

comprehensive belief system, world view, or framework that guides research …" (Willis, 2007, p. 8).

Herein, a postpositivist paradigm framed the research through the following characteristic assumptions as informed by the works of Creswell (2013), Creswell & Creswell (2018) and Willis (2007): Ontological – reality exists outside the mind, but in the absence of knowable absolute truths; Epistemological – rules that govern reality exist, but observations are vulnerable to fallibility "… absolute truth can never be found" (Creswell & Creswell, 2018, p. 7); Axiological – biases can interfere with knowing reality as it is and must be controlled for while the researcher functions as an objective observer and stands apart from their participants with minimal interaction; Methodological – through use of the scientific method new knowledge of reality can be gained, deductive methods reinforce goal of testing identified theory by defining relevant variables, making comparisons and looking for relationships whether correlational or causal.

Historically, the postpositivist researcher would test their theories by using their data to falsify hypotheses; if falsified, a theory would then be adapted or replaced (Willis, 2007). Such an approach reflected the influence of the prominent philosopher of science, Karl Popper who argued for falsification, acknowledging that it was impossible to be fully certain regarding the veracity of a theory (Popper cited in Willis, 2007, p. 73). Such a stance was in response to the rigidity of positivism which "sought to ground science [including theory] in an incorrigible (uncorrectable) source of knowledge (e.g., sense data and logical truths)" (Hicks, 2018, p. 1276). Strict adherence to rejecting a theory based on falsification over time has yielded to "… a modified falsification approach in which

failures may result from a number of things – instrumentation, misinterpretation of the data, misapplication of the theory, poor sampling, and so on – and therefore do not always mean your core theory is wrong" (Willis, 2007, p. 73).

While postpositivists similarly acknowledged the existence of an objective reality, they departed from positivists in their assumption "… that there is no secure foundation that humans can use to decide what is true and what is not" (Willis, 2007, p. 49). This caveat distinguishes postpositivism from positivism. Furthermore, postpositivists allowed for theory development to be intertwined with data collection because postpositivists rejected the positivist notion that data could be objectively collected free from the influence of theory (Willis, 2007).

As an example of a quantitative research paradigm, postpositivism thus relies on empirical inquiry to understand social reality (J. T. Leung & Shek, 2018). Theory is to be proposed before data collection and tested via discrete, well-articulated research questions and hypotheses (Creswell & Creswell, 2018; Willis, 2007); from results of a series of sequential research inquiries, theory can be advanced through adaptation or replacement (Willis, 2007). Finally, research conducted within a postpositivist frame will necessarily "… demonstrate internal validity (i.e., accurate interpretability of research results), external validity (i.e., generalizability of research results), and reliability (i.e., consistency and replicability of the methods and results) of the findings" (J. T. Leung & Shek, 2018, p. 1349).

Adhering to a postpositivist paradigm as described above, and as advised by Terrell (2016), herein the researcher functioned as an objective observer and remained separate from the study itself. The research process was deductive and intended to be

value-free. The current study sought to describe the perceptions of visitors to local nature trails walking with at least one dog. Assessed perceptions in the sample of trail visitors walking with a dog included those of antecedent outdoor recreation conflict factors and the core factors in the HBM framework. Through self-reports, dog-waste collection and leashing practices were also measured. The use of a quantitative survey was thus appropriate.

The descriptive data were subsequently used (and in some cases first transformed) to determine relationships between perceptions of antecedent conflict factors and dog management practices (both leashing and dog-waste collection), between perceptions of HBM constructs and dog-waste collection, and between perceptions of antecedent outdoor recreation conflict factors and HBM factors. Finally, the ORCM was integrated into the HBM by examining the relationships between HBM factors and dog-waste collection behavior while using elements of ORCM as stratifying variables.

Research Design

A cross-sectional, descriptive survey provided data for subsequent inferential analyses that explored relationships between variables obtained from one sample. Tests of association were conducted using Pearson's chi square to examine relationships between variables, $p < .05$. For example, a chi square test of relationship between dog-waste collection behavior and representative indicators of each HBM factor was conducted using 2 x 2 contingency tables. A correlational method was used because there was one group of participants (trail visitors walking with a dog) for whom relationships between different variables were assessed (Creswell & Creswell, 2018; Field, 2013; Terrell, 2016). An alternative method suited for descriptive data is a causal-comparative

design (Creswell & Creswell, 2018; Terrell, 2016). It however compares data between two different existing groups rather than compare different variables from one group; thus, a correlational approach was the more appropriate approach herein.

From among correlation test-options, Pearson's chi-square test was selected because level of measurement of the data was categorical. Statistically significant effect sizes were reported as Phi correlation coefficient; McHugh (2018) recommended that the nonparametric Phi correlation coefficient be used after the determination that two dichotomous variables are related. (In cases where the variables are not dichotomous, Cramer's *v* was reported as a measure of effect size.) A weak relationship or small effect is indicated by Phi (or Cramer's *v*) values less than .3; values between .3 and .49 are considered to be indicative of medium strength or moderate size; while Phi values .5 or larger indicate a strong relationship or large size effect (Field, 2013; McHugh, 2018). Odds ratio analyses were used to further understand statistically significant effect sizes (Field, 2013). Fisher's Exact test was considered when chi-square test assumptions for expected cell counts were violated. Surveys were administered to each participant on one occasion, thus the cross-sectional aspect of the study (Field, 2013).

Participants and Sampling

The population of most interest herein was trail visitors who walk with dogs *and* do not collect dog waste and/or do not use a leash for the full duration of the visit. Given the social undesirability associated with noncompliance, it is unlikely that a sufficient number of noncompliers would have readily identified themselves to participate in the research (e.g., see Bowling, 2005). With the aim of including noncompliers without

labelling them as such during recruitment, the population of interest then became all adult visitors who walk with dogs on nature trails in the two selected towns.

Practical concerns inhibited the use of an intercept survey approach, that is an approach in which the participant completes participation in the research study at the point of recruitment in the field. Feedback during an informal pilot of the survey indicated that respondents thought it unlikely they would complete such a survey at the end of a trail walk, primarily because they would be responsible for the dog(s) that was with them. Use of a survey available online was thus adopted. To ensure that some participants had recently walked a nature trail with a dog, some recruitment took place in the field, at the trail. Noting that others have struggled with reaching an adequate sample size in the field (e.g., Gibson and Fix (2014) attributed their relatively small outdoor recreation sample size of 89 to a field setting with an unanticipated "low user population" p. 4) and recognizing that that may be the case in this field research setting, three other recruitment strategies were developed in the pursuit of an adequate sample size to preserve options for inferential analyses.

Posting information sheets with a link to an online version of the survey in public places and no-cost news outlets was one additional recruitment strategy; another was an effort using email to circulate the link to the online survey; a third relied on the social media platform Facebook for distribution of the online link. Non-probabilistic purposive sampling was used (Creswell & Creswell, 2018). Recruitment and sampling are further discussed in the section labelled Research Procedures.

Participants were visitors, to local nature trails in suburban communities in central Massachusetts, who walked with at least one dog. Participants were at least 18 years old.

Recruitment at the trail site, involved inviting visitors walking with a dog(s) to visit the online survey and participate if they wished. A pen-and-paper version of the survey was available upon request from potential respondents; pen-and-paper versions of the survey were accompanied by a pre-addressed, postage paid envelope for mailing at a United States Postal Service location. If the recruiter (i.e., the researcher) was already involved with a potential participant when another trail visitor with a dog appeared (either entering or exiting the trail), the second visitor was not approached at that time.

Such an approach onsite (handing out the link to an online survey to be completed at a later time) also helped to minimize a response bias toward social desirability (Bowling, 2005) by removing the social interaction with a data collector, while also providing the participant the opportunity to complete the survey at a time when not responsible for a dog in a public space. Additionally, "…studies examining respondents' preferences report that people prefer … electronic self-completion questionnaires to paper self-completion questionnaires" (Bowling, 2005, p. 287). Both methods were available to maximize participation. Others who examined effects of response method noted no difference or only small differences between self-administered online or paper questionnaires when assessing emotions, patient satisfaction, or health services ratings (for review see Bowling, 2005). The use of more than one means to participate (as well as the use of a mail back paper-and-pen questionnaire approach or in-person distribution of a link to an online survey) have been successful in previous outdoor recreation research (Mann & Absher, 2008; Miller & McCool, 2003; Oftedal et al., 2015; Schuster, et al., 2006; Usher & Gomez, 2017).

While the largest sample size possible was the goal, the researcher recognized the requirement of a minimal sample size for planned statistical analyses. Based on an a priori power analysis (with power set at 80%), to determine a moderate effect (.3 or greater) accurately 95% of the time ($p < .05$) when using a Chi-square goodness of fit test (Gordon, 2018; S. E. Williams, 2007) with 7 df, a sample size of 160 participants was necessary (G*Power software was used per Field, 2013). The goodness of fit test was used in the a priori power analysis to determine sample size, because it was the method by which representative indicators of the HBM factors would be determined.

Inclusion/Exclusion Criteria

Visitors to local trails who were 18 years of age or older and walked with a dog(s) were included. Visitors who did not walk with a dog(s), who were younger than 18 years old, or who did not visit local trails were excluded from recruitment. Knowledge of the English language was assumed because all communication was in English.

Instrumentation

The survey included four groups of questions: demographics/characteristics (gender, age, education, residency, trails visited, frequency of trail visits and source of survey link); dog waste collection and leashing practices; ORCM antecedent conflict factors in outdoor recreation (activity style, resource specificity and lifestyle tolerance), and HBM factors of threats, benefits, barriers and cues to act as they relate to dog-waste collection behaviors. As an indicator of conflict potential, responses indicative of lifestyle tolerance, were further explored for the frequency with which participants encountered them during past visits. The survey was piloted with people known to the researcher most of whom were dog owners. Participants in the pilot worked in land management in one

way or the other or were work colleagues or friends residing outside the immediate study area. The pilot study was used to obtain feedback regarding clarity, length, and relevance. Edits to the survey were made accordingly. The online setting allowed subsets of questions to be posed in random order as an effort to manage the influence from order effects. A blank sample of the finalized survey in its entirety appears in Appendix A.

Demographics/characteristics

Participants were asked to indicate how they received access to the survey. They were asked to indicate which trails they and their dog usually visited, choosing as many that applied from the provided list of trail names; and they were asked how often they and their dog usually visited such local nature trails. Six frequency response options ranged from 'Daily' to 'A few times each year' were offered. Adapted from Vaske & Donnelly (2007), gender, age, education, and residency were collected. Response categories for gender were female, male and other; age was indicated by recording the number of years in response to 'How old were you on your most recent birthday'; level of education was indicated by choosing one option from six categorical possibilities (e.g., 'high school or less' or 'some graduate school'); and residence was indicated by checking the name of one of five Town names or recording the Town name under 'Other'.

Dog-Waste Collection and Leashing Practices

Two 5-point Likert-type questions (e.g., Gracyalny, 2017) were used to measure dog-waste collection practices. They were "When you and your dog visit your usual local nature trail(s), how often do you pick up your dog's poop?" and "… how often do you leave bagged poop on the ground?" Responses ranged from 1 = Never to 5 = Always.

One 5-point Likert type question was used to measure leashing practices: “When you and your dog visit your usual local nature trail(s), for how much of the time do you have your dog(s) on leash?” Responses ranged from 1 = None of the time to 5 = All of the time.

Outdoor Recreation Conflict – Antecedent Factors

To manage the overall length of the survey and to minimize the likelihood of participant fatigue, only three antecedent conflict factors proposed by Jacob & Shreyer (1980) were measured. Activity Style, Resource Specificity, and Lifestyle Tolerance were included.

Antecedent conflict factor: Activity style. This antecedent conflict factor was measured by assessing visit motivation using items from a well-established scale used to assess recreation motivations (Manfredo, Driver, & Tarrant, 1996). Visit motivation can also be understood as the reason(s) for the visit. The early work of Driver honed items that measured desire for end-state experiences (Driver cited in Manning, 2011 and in Manfredo, et al, 1996). “The motivation scales have been developed and refined through dozens of empirical studies, and tests have generally confirmed both the reliability and validity of the motivation scales…” (Manning, 2011). Frequently only portions of the lengthy scale are used in research (Arnberger & Eder, 2012; I. E. Schneider, Earing, & Martinson, 2013), presumably from a feasibility perspective to avoid participant fatigue and to facilitate survey completion. Herein, participants were asked to indicate which of the five provided visit reasons was usually the most important reason for their typical visits to local trails with a dog. Participants were asked to rank the five visit reasons in terms of relative importance. Four of the reasons were selected from different domains in

the established scale (see Manfredo et al., 1996); the dog specific item was modeled after Arnberger & Eder (2012). The motivation/visit reason options were “To enjoy the landscape and nature”, “To exercise, be physically active”, “To walk the dog(s)”, “To experience tranquility” and “To do something with my family, friends”.

While this method of measurement (ranking relative importance of visit reason rather than rating the importance of each visit reason) contributed to ease of completing the survey, it was selected due to the researcher’s interest in determining which of the listed reasons was the most important reason. This approach differs from typical practice of asking respondents to indicate how important each visit reason is to them; often, as a prelude to asking a follow-up question regarding whether their important visit reasons/motivations were interfered with, thus positioning the researcher to assess recreational conflict using the goal interference model (e.g., Manning, 2011). The current research interest did not include whether the visit motivation was interfered with or satisfied. Herein, the interest was on learning which, of a handful of possible motivations, emerged as the top motivation for a typical trail visit when the visitor is accompanied by a dog and whether the top motivation was always ‘to walk the dog’. The research interest then extended to considering the ‘most important motivation’ in relationship to dog-management practices and in relation to perceived representative indicators of the HBM constructs.

Antecedent conflict factor: Resource specificity. Place attachment is a construct often assessed under the umbrella of resource specificity. Place attachment has been shown to be comprised of two dimensions: place identity and place dependence (D. R. Williams & Vaske, 2003). Herein one dimension was measured: place identity. Place

identity reflects an emotionally based relationship with a place, while place dependence is thought to reflect a functionally based relationship (D. R. Williams & Vaske, 2003). It is reasonable to ask whether participants were emotionally attached through place identity to the nature trails they frequented.

Place identity alone was selected as a measure in part to maintain reasonable survey length, in part because it could be more easily applied to a collection of similar trails, and research by others indicates that place dependence loses value when one venue can easily be substituted by another venue (e.g., White, et al., 2008). Feedback in an informal pilot study also suggested the latter might be the case because respondents had difficulty understanding the question and were frustrated by it. The ready availability of other local nature trails which participants can easily access for walking with their dogs appeared to make it difficult for respondents to think that reasons for visiting one trail could not be satisfied by visiting a different local trail.

Place identity was measured by using four well-documented Likert-type items (see D.R. Williams & Vaske, 2003). Participants indicated their degree of agreement (from among five options ranging from 1 = strongly disagree to 5 = strongly agree) with each item. The items were presented in different orders to participants; they were: The trails I visit most mean a lot to me; I am very attached to the local trails I visit most; I identify strongly with the local trails I visit most; I have a special connection to the local trails I visit most and to the people who visit them.

Visit frequency was used as an additional measure of resource specificity because it is through frequently visiting a place that we come to know it, and this in turn informs attachment (Jacob & Schreyer; 1980; Smaldone, 2006). Participants were asked how

often they and their dog usually visited their local nature trails. Six frequency response options ranging from ‘Daily’ to ‘A few times each year’ were offered.

Antecedent conflict factor: Lifestyle tolerance. The antecedent conflict factor, lifestyle tolerance, was measured using a set of questions developed by Vaske & Donnelly (2007) specifically regarding perceptions of human-dog interactions considered potential sources of conflict. “This list of behaviors was developed collectively from input provided by OSMP [Open Space and Mountain Parks, Boulder, CO] and interested citizen group representatives” (Vaske & Donnelly, 2007), thus suggesting its validity. The list of 11 behaviors included one pertaining to dog waste collection: “Owners not picking up after their dogs”; the remaining 10 described typical off leash behaviors. To this list a 12th behavior and second dog-waste related item was added: “Owners leaving bagged waste on the trail”.

Five of these behaviors were categorized by Vaske and Donnelly as *direct* interactions because the dog approached or touched a trail visitor other than their owner/guardian; the remaining seven behaviors were considered *indirect* interactions with dog-related behavior since these behaviors involved owner behavior or impacts on the natural setting. Direct and indirect interactions were intermingled when listed in the survey. Tolerance for these human-dog interactions was assessed by asking participants to indicate how problematic each behavior would be were it to be encountered or observed when walking on a local nature trail. Modeled after Vaske & Donnelly (2007), Likert-type response options were 0 = Not at all a problem, 1 = Slight problem, 2 = Moderate problem, 3 = Extreme problem.

Perceptions of Outdoor Recreation Conflict Potential

Participants were then asked to indicate how frequently they encountered each of the 12 human-dog interactions, posed as potential sources of conflict when visiting local nature trails. Again, a Likert-type question was used where 1 = Never, 2 = Sometimes, 3 = Often, and 4 = Always. Conflict potential was then calculated by considering perceived problem level of the human-dog interaction with past exposure to the human-dog interaction. While it is common to measure conflict experienced during a specific visit, researchers have also inquired about perceptions across a series of visits (e.g., Hidalgo & Harshaw, 2010; Usher & Gomez, 2017) as was done herein.

HBM Constructs of Threats, Benefits, Barriers and Cues to Action

Assessment of the core HBM constructs was modeled after Typhina (2011) and Typhina and Yan (2014). This was done to optimize comparison of results across studies. In applying the HBM to dog-waste collection behavior, the HBM factors were first defined (Janz, Champion, & Strecher, 2002; Typhina & Yan, 2014). Similar to definitions used by Typhina & Yan (see p. 75), herein the factors, as they relate to the behavior of dog-waste collection, were defined as:

Threat. The perceived negative consequences that could occur to one's self or to other people or the environment if dog waste is not picked up and put in the trash.

Benefit(s). The perceived positive consequences that could occur to one's self, to other people or the environment if dog waste is picked up and put in the trash.

Barrier(s). The perceived obstacles preventing the collection of dog waste and putting it in the trash.

Cues to action. The perceived things (e.g., messenger and media) that can serve as a reminder or trigger to pick up dog waste and put it in the trash.

With an objective of identifying the representative indicator of each construct, participants were asked to choose a single best response from a list of possible options. These options were adapted from Typhina (2011) and Typhina & Yan (2014) who developed their lists to be relevant to dog walkers in different contexts (street, trail and yard) and who rooted their options in results from previous pet waste surveys. As an effort to optimize scale validity, these researchers sought the 'expert judgement' of city staff and officials, university faculty with dogs, and residents with dogs. Adaptations herein reflect a focus on nature trails, especially for Cue to action: Messenger. Since Typhina & Yan reported no correlation between the representative construct indicator of Enforcement Officer and self-reported waste collection behavior, herein a list was compiled of those people who trail visitors might encounter while on a nature trail that is not staffed. Examples include other trail visitors, a person responsible for trail conditions (e.g., conservation agent or trail steward), other trail visitors walking with a dog, and the landowner.

For each HBM construct question, response options included 'I don't know' as well as 'Other' with the ability to record what that 'Other' option was. Both were retained to promote cross study comparison with Typhina & Yan (2014). Similarly, five questions were asked. One each for threat, benefit, and barrier; and two for cues to action: one for messenger and one for media.

Appendix A provides the reader with the entire survey. An example of how the indicators of an HBM construct were assessed follows. To assess the representative

indicator for Benefit of picking up dog waste and putting it in trash, participants were asked: Of the following, which one do you think is the best reason to pick up your dog's waste and put it in the trash? Response options were: Other dogs or people won't get sick from it; I don't know; Other reason - please describe; Elimination of unsightly dog waste; People won't step in it; Water sources won't get polluted from it; Elimination of foul-smelling dog waste. Indicators for other HBM constructs were similarly assessed (see Appendix A).

Research Setting

People who walked their dogs on nature trails in one or both of two central Massachusetts communities were recruited either at a trail head or via electronic communications or posting of flyers in places open to the public (e.g., Town Hall, Town Library, local retail spots or trail heads). Northborough and Westborough, Massachusetts share a boundary line and are similar in population size (between 15,000 and 20,000). The same regional land trust was active in both; a separate local land trust was active in one community, while the other had an active trails committee established by the municipality for the sole purpose of maintaining the trails. Each community had over ten trails and between the two communities more than 25 trails, varying in length and terrain, were available to the public. (Appendix B offers images from some of the trails.) None of the trails were staffed by oversight entities (i.e., there was no 'park ranger' or 'trail manager' on site).

A municipal leash law requiring dogs to always be leashed in public spaces was in effect in one community (see Town of Northborough, Massachusetts, Municipal Code, April 22, 2019), while the other was transitioning to requiring a dog to be under control

by leash (or electric collar) in public spaces (see Town of Westborough, Massachusetts General Bylaws, Amended 2019 Annual Town Meeting). Prior to the bylaw change, at some trails in this second community signage already existed stating that pets must always be leashed when on the trail.

Both communities were subject to new state regulations (which were enacted three months prior to recruitment beginning) requiring dogs to be leashed, unless actively engaged as a hunting-dog, when on State-owned wild-life management areas open to the public and requiring dog-waste collection depending on location and purpose of visit (for details visit https://www.mass.gov/service-details/wildlife-management-area-regulations). Both municipalities required, in public spaces over which they had jurisdiction, dog waste to be collected and disposed of in the trash. Given the inconsistencies in regulations, self-reported dog-waste collection and leash use behaviors were no longer considered herein measures of compliance but rather simply as dog-walking practices.

Research Procedures

Pilot Study of the Survey

The purpose of the pilot study was to identify any obstacles a respondent might encounter when completing the survey. Identifying confusing instructions, unfamiliar words, and items that frustrate were some of the goals of the pilot. Additionally, the pilot gave the researcher opportunity to practice inviting an individual to visit the link to the online survey. The survey was offered to several dog owners with whom this researcher was acquainted. The pilot sample included a mix of land managers, work colleagues, and friends. The survey was then tweaked to reflect feedback from the pilot.

Recruitment

Practical concerns inhibited the use of an intercept survey approach. Feedback during informal pilots of the survey indicated that respondents thought it unlikely they would complete such a survey at the end of a trail walk with a dog. To ensure that some participants had recently walked a nature trail with a dog, one strategy of recruitment took place in the field at a trail. It was thought that in this way visitors who do not leash their dog or collect dog waste would certainly be invited to participate since all visitors with dogs would be approached. Recognizing this recruitment approach might yield a small sample size and compromise generalizability, other recruitment strategies were developed. Posting information sheets in public places and no-cost local news outlets was one strategy; another strategy utilized email; while a third relied on social media (e.g., the link to the online survey could be circulated electronically by members in Facebook user groups). The intent of each recruitment strategy was distribution of the link to the online survey. Appendix C provides examples of promotional materials.

Strategy 1. Recruitment sessions at four different local nature trails were conducted by this researcher accompanied by one of two assistants. Assistants were trained to optimize standardized recruitment and observational data collection. A recruitment script was used by the researcher when talking with trail visitors and a protocol for collecting observational data (number with dogs, number invited to participate, number who refused, number who took printed survey with them, number who accepted card with link to online survey) was used by the assistant. Data collectors were to maintain a professional yet friendly stance toward visitors and potential participants. Trail visitors with dogs were briefly informed by the researcher of the

study's purpose and offered a mini, yellow information sheet with the link to the online survey. Laminated, full-sized (8.5 x 11 inches) yellow information sheets were posted at trailheads that had a kiosk or otherwise appropriate spot to affix the information sheet. The link was provided as a URL and as a QR code. See Appendix D for sample script and data collection form for observations during recruitment at trail heads.

Participants were also recruited through outreach away from trails:

Strategy 2. The researcher sought to post information sheets in public spaces in each Town (e.g., Town Hall, Town Library, Senior Centers, retail locations), publish same in no-cost local news outlets in print and online, and circulate the online link using Facebook. Outreach through Facebook included joining local groups with a dog-related interest. Such outreach invited online participation by including the URL and QR Code for the online version of the survey.

Strategy 3. The researcher also emailed the URL and QR Code to those involved in local land management for whom she could find a publicly available email address (e.g., municipal officials, land trust staff, trail volunteers) with the request that the URL and QR Code be forwarded to their membership or those with whom they were familiar who might walk local trails with a dog. The researcher also looked for local member-based organizations that might share an interest in land management or companion dogs to whom she could reach out, with the request to circulate the URL and QR Code. See Appendix E for sample of email message.

Data Collection

Preparation. As a courtesy, the researcher introduced herself and the research project to local law enforcement and to those in both towns who had oversight over a

handful of trails thought to be popular with visitors who walk with a dog. In this way, officials would not be surprised if they became aware of the research through public postings or from a trail visitor reporting back that someone was approaching trail visitors. The researcher also obtained a letter of introduction from those with trail oversight; such letters would be used by the researcher when conducting in-person recruitment in the event her presence at a trail was questioned.

Set-up at trailhead. At trailhead/parking area, a portable 'research station' was set up and clearly identified as such. The researcher and assistant wore nametags (examples are included in Appendix D) indicating their research staff status. A folding tray, two folding chairs, water for dogs, the mini information sheet with link and QR Code to the online survey, log sheets, clipboard and pens, comprised the 'Set-up Kit'. Letters of introduction from officials with oversight were also included in order to enhance the credibility of the researcher. Printed surveys were stored in the researcher's vehicle, easily within reach, if any visitor requested a printed version.

Observational Data Collection. Visit Log Sheets with date of visit, time of day, and weather conditions were maintained. By observation, the following were also recorded on the Visit Log Sheet: number of trail visitors with a dog(s) and how many dogs each had with them, number of visitors without a dog, number of visitors invited to participate, number who refused invitation, and number ineligible due to age, language or having previously completed survey.

Participation. Trail visitors with dog(s) were invited to participate when entering or exiting the trail. When more than one trail visitor accompanied a dog, the visitor responsible for the dog's behavior was invited to participate. In cases where more than

one visitor stated such responsibility, each was invited to participate if they had not previously completed the survey.

Potential participants were asked to complete the survey within one week of being invited to participate in the study.

Data collection schedule. Data collection was planned for Spring and Summer of 2019 with a conditional extension into Fall if needed to reach minimum sample size requirements. Public postings and email distribution occurred for two weeks prior to the researcher going into the field to recruit. A 4-week recruitment period was planned for recruiting at the trails. Each week recruitment sessions were scheduled for three different days of the week (Mondays, Thursdays, and Saturdays) and at different times of day (e.g., 8–10 am and 4–6 pm). Twenty-four, 2-hour, field recruitment sessions were planned. The researcher was always accompanied by one of two trained assistants when conducting recruitment at trailheads. The period to recruit at the trails could be optionally extended when weather or researcher illness prevented conducting a recruitment session. Access to the online survey was planned to close two weeks after the final field recruitment session.

The Consent Process

Consent was obtained in accordance with the United States Department of Health and Human Services (HHS) regulations, 45 CFR part 46, subpart A (often referred to as the Common Rule) and with the Institutional Review Board (IRB) at Nova Southeastern University. The process was tailored for research that used the internet as a tool. It was anticipated that the majority of surveys would be completed online.

Consent was requested at the time the survey was to be completed, either electronically if completed online or by hand if a paper survey was preferred. (See Appendix F for example consent letter/form.) The participant was given the opportunity to read a description of the study's purpose; how long participation would last and what participation would involve; the expectation of minimal risk; how measures would be taken to maximize data security and confidentiality (including the absence of collecting any identifiable data); how participation was voluntary and participation could be discontinued at any point the participant chose; the secure data storage methods that would be used and for how long data would be stored.

The researcher recognizes that the consent process does not constitute 'informed' consent because there is no interaction between the participant and the researcher during the consenting process nor throughout study participation; nor is there true documentation of the granting of consent because there is no signature given nor signed copies of the consent given to the participant nor kept by the researcher. The Common Rule authorizes IRBs to waive documenting consent when risk of harm to participants is minimal or less, and no other consents are required for any element of participation in the research; such a waiver does not however exclude having a consenting process. To offer some measure of documenting that the participant actively showed their willingness to participate in the research, the Collaborative Institutional Training Initiative (CITI Program) suggests

> …designing an online consent form that includes a "live button" that subjects can click to demonstrate their consent. This version of an online consent form should include a statement to the effect of, "Clicking below indicates that I have read the

description of the study and I agree to participate in the study." Citiprogram.org, (2019), Module Internet-based research – SBE in Group 2: Social-Behavioral-Educational (Non-HPD) Researchers.

The researcher herein heeded such counsel in designing the online consent process.

A similar consenting process was used for those wanting to complete the survey via pen-and-paper because the researcher was not present when the participant read the consent form or agreed to participate.

Plans for Analysis

Surveys were reviewed for satisfactory completion, prior to being designated acceptable for analysis. Prior to analysis, electronic data files were checked for accuracy and data entry errors. Codes for missing data were employed; outliers were identified and checked against response possibilities and/or against the original survey. Survey completion method (online or pen-and-paper) was evaluated as a confounding variable before aggregating the data; it was anticipated that there would be no difference as a function of collection method (Bowling, 2005).

Participant Information

Demographic and participant characteristics data were reported in tabular format. Gender, education, and place of residence were reported as frequency counts with corresponding proportions; age was collected as a continuous variable and therefore reported as a mean, with range and SEM provided. How participants received the link to the online survey (or at which trail they received a paper copy) was summarized in tabular format using frequency counts and proportions. Which nature trails were regularly visited by participants was reported as frequency counts along with how often

participants visited local trails, which was assessed categorically and reported as frequency counts with corresponding proportions.

Self-reported Dog Management Practices

Self-reports of leash use during a typical trail visit, frequency of dog waste collection, and frequency of abandoning bagged waste were measured as three individual Likert-type questions and collectively comprised dog management practices. These data were described in a summary table reporting frequency counts and proportions of participants responding to each Likert-type option, for each question.

Indexing dog management practices. Two indices (one for leash use and one for dog-waste collection behaviors) were created by first recoding responses dichotomously. It was assumed that social desirability would inflate favorable responses (e.g., Bowling, 2005), therefore responses of none of the time, little of the time, about half the time and most of the time were grouped together as an indicator of those who do not consistently leash their dogs for the duration of a trail visit; similarly for those who do not always clean up after their dogs the responses of never, rarely, sometimes and often were grouped together as an indicator of those who are inconsistent collectors. (For the question regarding how often bagged dog waste was left on the ground, reverse coding was first applied, before coding collector status). For the leashing question then, responses of all of the time were recoded as 'consistent leash user' = 1, while responses of none of the time, little of the time, about half the time and most of the time were recoded as 'inconsistent leash user' = 0. Similarly, for the dog waste collection question, responses of always were recoded as 'consistent collector' = 1, while responses of never,

rarely, sometimes, and often were recoded ‘inconsistent collector’ = 0, after the bagged waste question was reverse coded.

The Leash Use Index relied on the response to one question, while the Dog-Waste Collection Index relied on responses to two questions. Leash use index scores reflected recoding responses dichotomously to indicate whether the participant reported using a leash for the full duration trail visits (coded as 1) or used a leash for less than the full duration (coded 0). The index for dog-waste collection behaviors (Dog-Waste Collection Index) was calculated by determining how many responses indicated consistent collector: zero, one or two. For example, there could be zero of two re-coded to ‘consistent collector’ or there could be 1 of 2 or 2 of 2 questions, so re-coded. An individual ‘Dog-Waste Collection Index’ score could thus equal 0, .5, or 1.0. A score of 1.0 indicates the participant reported that they *always* collect dog waste and *never* leave bagged waste.

Test for association between leash use and dog-waste collection was conducted using Pearson’s chi-square, $p < .05$. As reported by others, those who leash often also collect dog waste (Blenderman et al., 2018); such a measure herein provided a means by which to compare current findings to previously known findings.

Research Objective One - Descriptive

In order to position dog management practices within a conflict framework, ORCM antecedent conflict factors of activity style (as motivation measured as reason for trail visit), resource specificity (as visit frequency and as attachment measured as place identity), and lifestyle tolerance (perceptions of dog-related behaviors as problem behaviors) were described in tabular and/or cross-tabular format.

Activity style. For each of the five possible visit reasons, how frequently each item was ranked 1 = 'most important' was reported; the proportion of all respondents ranking the option as 'most important' was included. Modal responses for ranks of 2, 3, 4 and 5 were also reported.

Resource specificity. In tabular format, responses to each of the four place identity items were presented as frequency counts (and proportion of all responders) for each response option. An index was then created to represent place identity. The method used was modeled after that used to create the Dog Waste Collection Index. In this case however, after re-coding agree and strongly agree to 1 = 'attached' and strongly disagree, disagree, and neither to 0 = 'not attached', the place identity index value could range from 0 out of four (0/4) to four out of four (4/4); possible values thus included 0, .25, .50, .75 and 1.0. The closer the index value to 1.0 the greater the attachment to the trails through place identity.

Visit frequency was assessed through one question: How often do you and your dog usually visit the trails that you checked in Question 2? Participants chose one response from the following options Daily, Every 2 – 3 days, Once per week, Every 2 weeks, Monthly, A few times each year. Participants were grouped as frequent visitors when the response was once per week or more frequent and were grouped as infrequent visitors when the response was every 2 weeks or less.

Lifestyle tolerance. Responses indicating level of problem perception for 12 human-dog interactions were they to occur, were presented in tabular format and augmented with stacked bar charts. Frequency counts for each response option was presented separately for each human-dog interaction. Vaske & Donnelly (2007)

characterized these dog-related behaviors as direct and indirect interactions based on the degree to which the dog directly interacted with visitors other than their owner/guardian. The indirect behaviors were further subdivided herein by categorizing the two dog-waste items separately from the remaining five indirect behaviors.

Three separate indices (direct, dog-waste related, and indirect interactions) were created to summarize the degree to which human-dog interactions were perceived as problematic. Responses were recoded such that 0 = 'no problem' was comprised of the response 'not at all a problem' and 1 = 'problem' comprised of the responses 'slight problem', 'moderate problem', or 'extreme problem' as guided by techniques used by others (Carothers et al., 2001; Gibson & Fix, 2014; Vaske et al., 1995).

Tolerance Index-Direct. Values for the Tolerance Index-Direct ranged from zero out of five (0/5) to five out of five (5/5); the closer the value was to 1.0 (i.e., 5/5) the greater the number of such interactions having been perceived as a problem indicating less tolerance for indirect interactions with dogs (those that involved the dog interacting directly with a visitor through touch or approach).

Tolerance Index-Dog Waste. Values for Tolerance Index-Dog Waste ranged from zero out of two (0/2) to two out of two (2/2); the closer the index value was to 1.0 (i.e., 2/2) the more problematic dog-related behaviors that involved dog waste being left at the trail were perceived to be, indicating less tolerance for such behavior.

Tolerance Index-Indirect. Values for Tolerance Index-Indirect ranged from zero out of five (0/5) to five out of five (5/5); the closer the index value was to 1.0 (i.e., 5/5) the greater the number of such interactions having been perceived as a problem indicating

less tolerance for indirect interactions with dogs (e.g., wildlife fleeing dogs or owners calling after their dogs).

Perceptions of conflict potential. By considering past exposure in combination with perceived problem level (i.e., tolerance), 12 human-dog interactions were examined for their potential to be a source of conflict. Past exposure was first summarized using three charts showing stacked, horizontal bars grouped by type of human-dog interaction: direct, dog-waste related, and indirect as was done for problem perception. In order to then determine conflict potential, a more restrictive coding scheme was applied than is typically used in outdoor recreation (e.g., Gibson & Fix, 2014; Vaske & Donnelly, 2007; Vaske et al, 2007).

This was done because the interest herein shifts the focus from *type* of conflict to likelihood or potential for conflict In contrast to the definitions used to populate a 2 x 2 contingency table representing problem level and observation level as used by others (see Figure 4 on page 42), definitions for cell membership were modified such that to be coded as problem perceived, the response had to be at least moderate if not extreme problem; ‘a slight problem’ and ‘not a problem’ were then grouped together. Similarly, frequent and infrequent levels of past observations were distinguished from each other by grouping together often and always seen and then grouping together sometimes and never, respectively.

In this way the measure of conflict potential accounted for both degree of problem and the degree of frequency with which it had been encountered in the past. Conflict sensitivity (i.e. problem level) plus exposure (i.e., past observations) determined conflict potential. The resulting four categories to describe conflict potential for each of

the 12 human-dog interactions were: not a problem and not observed or not a problem and observed (both indicate potential as non-existent); a problem and not observed (non-triggered sensitivity); a problem and observed (triggered sensitivity).

Research Objective One – Inferential

Objective one included exploration of whether antecedent conflict factors were related to dog management practices. Dog-waste management practices were explored separately from leashing practices, thus producing two separate groups of hypotheses to test.

$H1_0$: Each antecedent conflict factor is unrelated to dog-waste collection.

$H1.1_a$: Visit motivation is related to dog-waste collection.

To determine the representative 'most important reason' for visiting a nature trail, a chi-square goodness of fit analysis (Gordon, 2018; S. E. Williams, 2007) was conducted, $p < .05$. Degrees of freedom equaled the number of response options minus one; consequently $df = 4$. Such a test examines whether observed frequency of responses differ from theory-based expected frequencies. Here, expected response frequency due to chance would be equally distributed frequencies across the five response options. Once determined, responses for the representative most important visit reason were recoded to 1 = the representative most important reason was present or 0 = the representative most important reason was absent (i.e., the option had been ranked less than 1^{st}). Dog-Waste Collection Index was dichotomously recoded grouping scores of 1.0 separately from scores less than 1.0; index values of 1.0 were considered consistent collectors, while index values less than one were considered inconsistent collectors. A 2 x 2 chi-square test of association between most important visit reason and dog-waste collection was then

conducted, $p < .05$. Strength of statistically significant association was assessed using Phi correlation coefficient analysis (McHugh, 2018) and further described through odds ratio analysis (Field, 2013).

$H1.2_a$: Place identity is related to dog-waste collection.

Place identity index values $\geq .5$ were recoded to 'attached' while index values $< .5$ were coded 'not attached'. Relationship between place identity and dog-waste collection behavior was explored by conducting a 2 x 2 chi-square test of association using the recoded Place Identity Index and Dog-Waste Collection Index, $p < .05$. Strength of statistically significant association was assessed using Phi correlation coefficient analysis (McHugh, 2018).

$H1.2.1_a$ Visit frequency is related to dog waste collection.

Relationship between visit frequency and dog-waste collection behavior was explored by conducting a 2 x 2 chi-square test of association (using a dichotomized measure of visit frequency: frequent visitors visited trail at least once per week or more often; infrequent visitors visited every 2 weeks or less frequently), $p < .05$. Strength of statistically significant association was assessed using Phi correlation coefficient analysis (McHugh, 2018) and further described through odds ratio analysis (Field, 2013).

$H1.3_a$: Tolerance for human-dog interactions is related to dog waste collection.

A 2 x 2 chi square test of association was used to explore relation between tolerance for dog-related behaviors and dog-waste collection (Dog-waste Collection Index). Significance level was set at $p < .05$. A separate analysis was conducted for each of the three tolerance indices after index values were dichotomized as more tolerant and

less tolerant. Strength of statistically significant association was assessed using Phi and odds ratio analysis.

Leash use in relationship to antecedent conflict factors was explored via the following hypotheses:

$H2_0$: Each antecedent conflict factor is unrelated to dog leashing practices.

$H2.1_a$: Visit motivation is related to dog leashing practices.

$H2.2_a$: Place identity is related to dog leashing practices.

$H2.2.1_a$: Visit frequency is related to dog leashing practices.

$H2.3_a$: Tolerance of dog-related behaviors is related to dog leashing practices.

Tests of these hypotheses were conducted in similar fashion to the series of H1 hypotheses using the dichotomized Leash Use Index: leash use for full duration of trail visit or leash use for less than full duration of trail visit.

Research Objective Two – Descriptive

HBM constructs. For each HBM construct (threat, benefit, barrier, cue to act: messenger and cue to act: media), frequency counts per option with corresponding proportions were reported in tabular format.

Research Objective Two – Inferential

For each HBM factor: threat, benefit, barriers, cue to action: messenger, and cue to action: media, a representative indicator was determined using a nonparametric omnibus chi-square goodness-of-fit analysis (Gordon, 2018; S. E. Williams, 2007). Degrees of freedom equaled the number of response options less one; the significance level was set to $p < .05$. The chi-square goodness-of-fit test reports whether observed

values are different from values expected due to chance. Thus, the null hypothesis for each HBM factor was that responses would be equally distributed among the options.

Significant test results were further considered post hoc by examining standardized residuals to determine which observed frequencies differed positively from expected frequencies (Field, 2013; Sharpe, 2015). When the frequencies of more than one response option contributed to the overall statistically significant chi-square test statistic, the stronger contributor was designated the representative indicator for the HBM factor. This approach is consistent with that used by Typhina & Yan (2014) though insufficient information was reported therein to ensure that representative indicators were determined in the same way.

Once representative indicators were determined for each HBM factor, the tests of relationship with dog-waste collection were conducted.

$H3_0$: Each representative indicator of the HBM constructs is unrelated to dog waste collection.

$H3.1_a$: Threat is related to dog-waste collection behavior.

$H3.2_a$: Benefit is related to dog-waste collection behavior.

$H3.3_a$: Barrier is related to dog-waste collection behavior.

$H3.4_a$: Cue to Act-Messenger is related to dog-waste collection behavior.

H3.5a Cue to Act-Media is related to dog-waste collection behavior.

Considerations for cross study comparison. To explore the strength of association between representative indicators of HBM constructs and self-reported waste collection practices the Phi correlation coefficient (Phi) was used in keeping with Typhina & Yan's (2014) approach and that suggested by others (Field, 2013; McHugh,

2018). After transforming the data into dichotomous variables, a 2 x 2 chi-square analysis was first conducted to determine relationship status between representative indicator of HBM factors and dog-waste collection, with significance level set at $p < .05$. If statistically significant, then effect size was determined using the Phi correlation coefficient analysis (McHugh, 2018). Additionally, to further understand effect size, odds ratio analyses were conducted as suggested by Field (2013).

Dichotomous variables were created for this analysis, by first recoding indicators of HBM constructs to 1 = representative indicator present or 0 = representative indicator not present; similarly, the Dog-Waste Collection Index was dichotomized as explained under Research Objective One – Inferential. Recoding the index in this way was intended to better align the format of the data with the dichotomous format used by Typhina & Yan (2014) at the point of data collection.

Research Objective Three

The third aim of the current study was to test for relationship between ORCM antecedent conflict factors and the representative indicators of the HBM factors for the conflict-prevention behavior of dog-waste collection. This was done as a prelude to integrating the two theories analytically. Chi-square tests of association using 2 x 2 contingency tables were conducted, $p < .05$. Effect sizes of significant results were reported as Phi and through odds ratio analysis. The resulting null hypothesis and corresponding alternative hypotheses were:

> **$H4_0$: Each antecedent conflict factor is unrelated to the representative indicator of the HBM factors (threat, benefit, barrier, messenger, and media) for the conflict-prevention behavior of dog waste collection and disposal.**

$H4.1_a$: Lifestyle tolerance, as measured through tolerance for human-dog interactions, is related to the representative indicators of the HBM factors.

$H4.2_a$: Activity style as measured through most important reason for trail visit is related to the representative indicators of the HBM factors.

$H4.3_a$: Resource specificity as visit frequency is related to the representative indicators of the HBM constructs.

$H4.3.1_{a:}$ Resource specificity as place identity is related to the representative indicators of the HBM constructs.

Tests of association under this research objective used measures of lifestyle tolerance that were more restrictive than those typically used in studies of outdoor recreation conflict. Sensitivity to the perception of the behavior as a problem rather than conflict typing was of interest and therefore the recoding logic was as follows: group not a problem and a slight problem together and then group moderate and extreme problem together. In this way sensitivity to the potential conflict source was considered. Each of three re-coded indices reflected whether there was more tolerance or less tolerance for human-dog interactions. As in HBM theory where threat must be sufficiently perceived (e.g., Champion & Skinner, 2008), so too must a potential conflict source be sufficiently perceived as a problem by at least one of the parties if not both (e.g., Hocker & Wilmot, 2014; Mayer; 2012; Pruitt & Kim, 2004; Tidwell, 1998)

Research Objective Four

The final aim of the current research was to explore integrating elements of the ORCM into the HBM framework for the task of developing a persuasive message to increase the collection of dog waste when on local trails. For this purpose, only threat,

benefit and barrier as HBM factors were considered in the tests of association with dog-waste collection. These three were used because they comprise the persuasive message. As ORCM elements, antecedent conflict factor as well as conflict potential, were positioned as stratifying variables resulting in the following hypotheses:

$H5_0$: Relationship between representative indicators of HBMs and dog-waste collection does not vary as level of ORCM element varies.

$H5.1_a$: Relationship between representative indicator of HBM *threat* and dog-waste collection varies as level of ORCM element varies.

$H5.2_a$: Relationship between representative indicator of HBM *benefit* and dog-waste collection varies as level of ORCM element varies.

$H5.3_a$: Relationship between representative indicator of HBM *barrier* and dog-waste collection varies as level of ORCM element varies.

For this analysis, conflict potential associated with the human-dog interaction of owners leaving dog waste was used as an element from ORCM. In this way, owners leaving dog waste was positioned as a source of conflict. Tests were conducted using chi-square tests of association with 2 x 2 contingency tables *and* the use of a stratifying variable, $p < .05$ with effect sizes reported as Phi and through odds ratio analyses. The stratifying variable (also known as a layering variable in SPSS) was either an antecedent conflict factor or conflict potential.

The online survey was constructed using the well-documented and commercially available software, SurveyMonkey. IBM SPSS, version 26, software was used for data management and both descriptive and inferential analyses.

Ethical Considerations

Recruitment and data collection began after the research proposal was approved by the Institutional Review Board (IRB) at Nova Southeastern University and was conducted in compliance with HHS regulations, 45 CFR part 46, subpart A (Common Rule). Efforts were taken to protect participants' privacy, confidentiality, and their autonomy.

Participants were informed that no identifiable information would be collected – either during recruitment or participation. (Pre-addressed envelopes for the return of paper surveys were pre-addressed for both Address and Return-address. In this way the participant did not have to reveal identifiable information.) The secure methods for data transmission and storage that would be used were described to potential participants. Participants were informed that risk associated with participation was thought to be negligible and that no personal identifying information would be collected. Participants were informed that they could discontinue participation at any time. Participants were informed that electronic data files would be kept on a password protected laptop equipped with antivirus and anti-malware software; electronic data files would also be stored on an external device (i.e., an external USB flash drive) which was physically stored with completed paper surveys in a private, locked, fire-proof safe located in the researcher's home. Documents and data files were maintained and destroyed per IRB guidance.

Chapter Summary

In this chapter, the four research objectives were restated with their associated hypotheses. A postpositivist philosophical research paradigm was then described. The

research design, participants and sampling method, and inclusion/exclusion criteria were each described in sequence. A section describing each element of the survey instrument was included. A detailed description of research procedures addressed preparation, recruitment, consenting, and data collection processes. Plans for descriptive and inferential data analyses were presented in serial order matching the prior presentation of research objectives and hypotheses. Issues of ethical importance were considered. Implications from the current research and its anticipated contributions will be addressed in the next chapter.

Chapter 4 - Results

The overarching purpose of this cross-sectional descriptive survey was to explore developing a conflict prevention strategy to reduce noncompliance with dog walking policies on local nature trails by pairing a theory of outdoor recreation conflict (see Manning, 2011) with an expectancy decision theory borrowed from public health (the Health Belief Model) (see Champion & Skinner, 2008; Typhina & Yan, 2014). A reduction in noncompliance is considered conflict-preventative because noncompliance can be a source of conflict.

In order to do this, self-reported measures of dog-waste collection and leash use were obtained, via the completion of an online survey, from visitors to local trails who walk with a dog. Three antecedent conflict factors from the outdoor recreation model were assessed. Associations between antecedent conflict factors and dog-waste collection and leash use behaviors were then assessed. Representative indicators for factors from of the health belief model for the recommended behavior of picking up dog waste (as measured by Typhina & Yin, 2014) were determined and then tested for association with the self-reported dog-waste collection practices using Pearson's chi square. Relationship between antecedent conflict factors and health belief model factors were also tested by using Pearson's chi square. Finally, whether antecedent conflict factors in combination with health belief model factors interact in relationship to dog-waste collection was explored by conducting chi square tests of association between HBM factors and dog waste management while stratifying for antecedent conflict factors. Significance level was set at $p < .05$ for all tests.

Pilot Study

During the Spring of 2019, the online survey instrument was completed by 14 participants who were known to the researcher as land managers (n = 6), colleagues (n=6) or friends (n=2) who had experience with walking a dog. The purpose of the pilot study was to identify any obstacles a respondent might encounter when completing the survey. All pilot participants reported it to be 'about the right length' and most did not encounter difficulty with the vocabulary used. One reported a technical issue but concluded it was the server and not the survey. Open-ended feedback prompted the researcher to clarify a couple of items and to anchor 'Other' as the last response option for items that included such a response option.

Research Setting

During recruitment sessions at trail heads, it was noted that some visitors were still reacting negatively to recent changes in State regulations governing walking with a dog in state wildlife management areas. It was also informally observed at trails in both towns, that visitor(s) had voluntarily created ways to provide bins for dog waste and have them emptied periodically. Additionally, within a month of data collection beginning, a dog was killed by drowning due to suction near a dam, at one of the Northborough trails that is very popular with visitors walking with a dog. (A Facebook group specifically for visitors to that trail was established by a dog-owning visitor shortly after the incident.) Finally, during the data collection period, the topic of establishing a dog park was on various committee agendas in Northborough. These varied and fluid circumstances reflect the challenge of controlling the research setting when conducting research in the field.

Data Collection

The planned 8-week recruitment period (two weeks electronic and paper promotions, four weeks at trail heads with ongoing electronic and paper promotion, then two weeks electronic and paper promotion only) was extended by two weeks of electronic and paper promotion only because initial recruitment outreach in Westborough was slower than in Northborough. The extension was intended to provide residents in Westborough comparable exposure to the availability of the online survey. This was done to proactively counter any pre-existing biases based on residency.

Sample Size

Three hundred and thirty-one (331) respondents anonymously submitted surveys during the 10-week, data-collection period. Data were imported from Survey Monkey to SPSS version 26 for data management and analysis. Surveys were reviewed for eligibility and completeness. During the consent process, five respondents did not give consent. Of the 326 respondents who gave consent, 284 submitted surveys that were sufficiently completed for analysis (an 87% completion rate) and are considered the participants. Table 2 lists specific reasons for rendering a survey insufficiently completed and ineligible for inclusion in the sample.

Table 2

Reasons for Removal from Sample

Reason for Removal		Number of Respondents
Ineligible – during consent:		
younger than 18 or does not walk with a dog on trails of interest		4
does not want to participate		1
	Subtotal	5
Ineligible - during data review:		
does not own a dog and/or open-ended responses were to questions not asked		2
does not currently walk trails with dog		1
inconsistency between responses (Survey Q5a & b)		1
which trail recently visited was blank		1
survey was blank save for consent question		20
incomplete survey: too few questions were answered		17
	Subtotal	42
	Total removed	47

Note: A total of 331 surveys were submitted; removal of 47 as ineligible respondents reduced participant sample size to 284.

Circulation of Link to the Online Survey

Data were collected through an online survey using the subscription services of Survey Monkey. Access to the survey was available for 10 weeks (from the last week of April 2019 through the end of June 2019). Recruitment at trailheads occurred as scheduled in 13 of 24 planned sessions. A combination of unusual stormy weather, illness, and assistant unavailability contributed to the completion of just half of the

sessions. About 100 invitations to participate in the research study were extended in this way.

The link to the online survey was circulated using the methods listed in Table 3. For each method, the number of participants who reported receiving the link by that method is also listed; note that participants could indicate only one method. The use of social media (i.e., Facebook posts) was the most frequent way by which the link was received with 38% of participants reporting receiving the link in this way.

Table 3

Method by Which Survey Link was Circulated and the Number of Participants Receiving the Link for Each Method

Method	Frequency	% of Valid Cases [a]
Facebook	108	38.0
Email message	69	24.3
Publicly posted	50	17.6
Local news outlet	27	9.5
From researcher at Westborough trail	18	6.3
From researcher at Northborough trail	12	4.2
Total	284	100.0

[a] There are no missing responses for this survey item; therefore, percentage of valid cases matches percentage of total sample size (N = 284) and thus only percentage of valid cases is reported here.

Demographics

Participants were primarily female (71.3%), lived in one of the two towns in which the nature trails were located (49.2% and 31.1% respectively), were middle-aged (mean age = 48.8 years, SD = 12.7, with 50 years being both the median and mode) and

well educated (37% completed college and another 42.1% earned graduate and professional degrees). Table 4 provides a detailed summary of these demographic characteristics of the sample.

Table 4

Sample Demographics

Variable (n = *x*)[a]	Frequency	% of Total (N = 284)	% of Valid Cases
Gender (n = 251)			
Female	179	63.0	71.3
Male	68	23.9	27.1
Other	4	1.4	1.6
Missing	33	11.6	n/a
Age (n = 243)			
Under 20 years	4	1.5	1.6
20 - 29	18	6.7	7.3
30 - 39	36	12.9	14.8
40 - 49	58	20.5	23.9
50 - 59	80	22.9	26.7
60 - 69	37	13.2	15
70 years and over	10	3.6	4.0
Missing	41	14.5	n/a
Residence (n = 254)			
Grafton	4	1.4	1.6
Marlborough	1	0.4	0.4
Northborough	125	44.0	49.2
Shrewsbury	25	8.8	9.8
Westborough	79	27.8	31.1
Other	20	7.0	7.9
Missing	30	10.6	n/a
Level of Education (n = 254)			
High school or less	7	2.5	2.8
Some college	26	9.2	10.2
College graduate	94	33.1	37.0
Some graduate school	20	7.0	7.9
Master's degree	73	25.7	28.7
Doctorate/professional	34	12.0	13.4
Missing	30	10.6	n/a

[a] n = *x* refers to the sample size for the variable under consideration given the number of missing responses for that variable.

Additional Characteristics of the Sample

Table 5 presents the trails that participants reported they usually visit when their dog is with them. Participants were allowed to select as many trails that applied to them. The top four trails are coincidentally the four that were selected prior to data collection to be the ones at which the researcher would hand out the link to the online survey. Two of these four trails were in Westborough (Chauncy Lake, 59.9% and Veteran's Freedom Park, 25.4%) and two were in Northborough (Carney & Cold Harbor, 52.5% and Mount Pisgah, 36.6%).

Table 5

Local trails visited by people walking with a dog and sorted by town

Trail Usually Visited	Frequency	% of Valid Cases [a, b]
Northborough		
Trail 1 Carlstrom	9	3.2
Trail 2 Carney& Cold Harbor	149	52.5
Trail 3 Cedar Hill	29	10.2
Trail 4 Edmund Hill	63	22.2
Trail 5 Yellick	20	7.0
Trail 6 Mount Pisgah	104	36.6
Trail 7 Little Chauncy	76	26.8
Trail 8 Aqueduct	44	15.5
Trail 9 Stirrup Brook	32	11.3
Trail 10 Schunder's Field	7	2.5
Other Nboro trail	28	9.9
Westborough		
Trail 1 Sawink	18	6.3
Trail 2 Walkup & Robinson	27	9.5
Trail 3 Veteran's Freedom	72	25.4
Trail 4 Mill Pond	65	22.9
Trail 5 Headwaters	24	8.5
Trail 6 Libbey & Wile	11	3.9
Trail 7 Upper Jackstraw	8	2.8
Trail 8 Bowman	38	13.4
Trail 9 South Cedar Swamp	20	7.0
Trail 10 Chauncy Lake	170	59.9
Other Wboro trail	40	14.1

[a] No missing cases so total sample size (N=284) and number of valid cases match
[b] When tallied, will exceed 100% because participants could indicate more than one trail

Approximately the same number of participants walked only Northborough trails (28.2%) or only Westborough trails (28.5%) with a greater number visiting trails in both towns (43.3%), as can be seen in Table 6.

Table 6

Participants as function of the town(s) in which they walk their dogs on local trails

Location of local trails visited with dog	Frequency	% of Valid Cases [a]
Northborough trails only	80	28.2
Westborough trails only	81	28.5
Trails in both towns	123	43.3

[a] There are no missing responses for this survey item; therefore, percentage of valid cases equals percentage of total sample size (N = 284) and thus only percentage of valid cases is reported here.

Participants were further described in terms of how frequently they visited a local trail with a dog, how many dogs usually accompanied them, and whether they were a professional dog walker. Table 7 presents these data. Only three participants (1.2%, n = 255) reported being professional dog walkers. Most trail visitors walked with only one dog (63.1%) while 20% walked with one or two dogs and another 12.5% of participants usually walked with two dogs. About 4% of participants reported visiting trails with three or more dogs; of note, only one of the 11 participants who reported walking with three or more dogs reported being a professional dog walker. Participants visited trails frequently with 30% visiting daily, 24% every two to three days, and 17% once per week. About 16% visited once or twice a month and 13% a few times a year.

Table 7

Characteristics related to walking with a dog: number of dogs usually accompanying visitor, whether visiting as a professional dog walker, and frequency of trail visits with a dog

Variable (valid cases)	Frequency	% of Total (N = 284)	% of Valid Cases (n = *x*) [a]
Number of Dogs (n = 255)			
One	161	56.7	63.1
One or two	51	18.0	20.0
Two	32	11.3	12.5
Two or three	6	2.1	2.4
Three	3	1.1	1.2
More than three	2	0.7	0.8
Missing	29	10.2	n/a
Professional Dog Walker (n = 255)			
Yes	3	1.1	1.2
No	252	88.7	98.8
Missing	29	10.2	n/a
Frequency of visiting trails with a dog (n = 284)			
Daily	85	29.9	29.9
Every 2 – 3 days	67	23.6	23.6
Once per week	48	16.9	16.9
Every 2 weeks	25	8.8	8.8
Monthly	21	7.4	7.4
A few times a year	38	13.4	13.4

[a] n = *x* refers to the sample size given the number of missing responses for the variable under consideration; it represents the number of valid cases for that variable.

Self-reported Dog Management Practices

Descriptive Analyses

Dog management practices as they relate to cleaning up after and leashing a dog while walking on a local nature trail are summarized in Table 8. Self-reports of how often participants pick up their dog's waste, how often they leave bagged waste on the ground

without retrieving it and how often they have their dog on leash are presented in the table as counts per each response option for each of the three questions. Nearly two-thirds of respondents reported the frequency with which they pick up their dog's waste as "Always" while only about 3% reported it as 'Never'. Regarding the leaving of bagged dog waste on the ground unretrieved, about 89% of participants reported "Never" doing this and none of the participants reported doing it "Always" or "Often". Finally, about 25% of participants reported using a leash "All of the time" during a visit to a local nature trail; about 40% of participants reported using a leash for "Little of the time" with an additional 11% reporting leash use as "None of the time".

Table 8

Self-reported dog management practices: dog-waste collection and leashing

Practice (valid cases)	Frequency	% of Total (N = 284)	% of Total Valid Cases (n = *x*)[a]
Frequency of picking up dog waste (n = 283)			
Never	9	3.2	3.2
Rarely	8	2.8	2.8
Sometimes	25	8.8	8.8
Often	53	18.7	18.7
Always	188	66.2	66.4
Missing	1	0.4	n/a
Frequency of leaving bagged dog-waste (n= 284)			
Never	252	88.7	88.7
Rarely	27	9.5	9.5
Sometimes	5	1.8	1.8
Often	0	0	0
Always	0	0	0
Visit portion with dog on leash (n = 283)			
None of the time	31	10.9	11.0
Little of the time	114	40.1	40.3
About half the time	32	11.3	11.3
Most of the time	34	12.0	12.0
All of the time	72	25.4	25.4
Missing	1	0.4	n/a

[a] n = *x* refers to the sample size given the number of missing responses for the variable under consideration.

Indexing Dog Management Practices

Two indices (one for leash use and one for dog-waste collection behaviors) were created by first recoding responses dichotomously. Leash behavior was categorized as 'consistent leash user' and 'inconsistent leash user' while dog-waste collection was categorized as 'consistent collector' and 'inconsistent collector'. Maintaining the assumption that the influence of social desirability would inflate favorable responses (e.g., Bowling, 2005), recoding for the leashing question categorized responses of all of the time as 'consistent leash user' = 1, while responses of none of the time, little of the time, about half the time and most of the time were recoded as 'inconsistent leash user' = 0. Similarly, for the dog waste collection questions, responses of always were recoded as 'consistent collector' = 1, while responses of never, rarely, sometimes and often were recoded 'inconsistent collector' = 0 (note that the leaving-bagged-waste question was first reverse coded).

Dog-Waste Collection Index. This index relied on responses to two questions. The index for dog-waste collection behaviors (Dog-Waste Collection Index) was calculated by determining how many responses indicated consistent collector: zero, one or two. For example, there could be zero of two re-coded to 'consistent collector' or there could be 1 of 2 or 2 of 2 questions, so re-coded. An individual Dog Waste Collection Index score could thus equal 0, .5, or 1.0. A score of 1.0 indicates the participant reported that they *always* collect dog waste and *never* leave bagged waste.

Using this coding approach, 14 (4.9%) of the valid responses (n = 283) were from participants categorized as inconsistent collectors for both questions; 99 (35%) were

categorized as less consistent based on their index score of 0.5; and 170 (60.1%) were fully consistent with 1.0 index scores.

Leash Use Index. This index relied on the response to one question. Leash Use index scores reflected recoding responses dichotomously to indicate whether the participant reported using a leash for the full duration of trail visits (coded 1) or used a leash for less than the full duration (coded 0). In this way, it was determined that 72 (25.4%) of the valid responses (n=283) were from participants who leashed consistently, i.e., for the full visit duration while 211 (74.6%) did not leash for the full duration visit.

Scores on the Dog-Waste Collection Index were further collapsed by recoding the middle scores of 0.5 as inconsistent collectors. In this way a binary variable was created. Table 9 lists the frequencies for the indices when considered as binary variables. As seen in Table 9, about 60% of participants reported they were consistent collectors of dog waste, while only about 25% reported they leashed their dogs for the full duration of a visit to a local nature trail.

Table 9

Dog Management Practices Summarized as Binary Indices Reflecting Self-reports of Dog-waste Collection and Leash Use When Walking with a Dog on a Local Nature Trail

Index	Consistent Collector/User (row % of 283 valid cases)	Inconsistent Collector/User (row % of 283 valid cases)
Dog-waste collection	170 (60.1)	113 (39.9)
Leash use	72 (25.4)	211 (74.6)

A 2x2 contingency table was created to test for relationship between dog waste collection and leash use; see Table 10. Using chi-square, the two dog management

practices are related as indicated by a significant association between the index for dog-waste collection and the index for leash use, x^2 (1) = 16.595, p < .001. Effect size as measured by Phi = .243 which falls between the small (.1) and moderate (.3) thresholds (Field, 2013). Based on an odds ratio analysis (following, Field (2013), pp. 744-745), the odds of consistently collecting dog waste, were 3.63 times higher if a leash was used for the full duration of a typical trail visit.

Table 10

Cross-tabulation of Leash Use Index and Recoded Dog -waste Collection Index for Test of Association Between the Two

	Recoded Dog-waste Collection Index		
Leash Use Index	Inconsistent Collector	Consistent Collector	Total
Inconsistent User	98	112	210
Consistent User	14	58	72
Total	112	170	282

Note: A consistent leash user reported using a leash for the full duration of a trail visit; a consistent dog-waste collector reported always picking up and never leaving bagged waste unretrieved.

Testing for Bias

To account for potential effects on self-reported dog-management responses as a function of how the survey link was received, the participant's town of residence, or when during the 10-week collection period the survey was completed, chi-square tests of association were conducted. Tests of association between each of these three variables and participant responses to survey question 5a regarding their frequency of picking up

their dog's waste and with survey question 6 regarding their use of a leash during a visit to a local trail were conducted.

In each case, assumptions for chi-square tests regarding minimum expected cell count were violated. Response categories for each of the three sample-descriptive variables were therefore collapsed into one of two categories. Responses indicating how the link was received were grouped as Facebook or email and as publicly posted, news outlet, or from researcher at trail; responses indicating place of residency were grouped as Northborough and as Westborough or Other community; responses indicating when survey was completed were grouped as during weeks 1 through 5 and as during weeks 6 through 10.

Table 11 presents the results of these tests for bias. One of the six analyses required further consolidation of categories to meet test assumptions. To test for an association between place of residence and dog waste collection, responses to dog waste collection were condensed from five possible options to three: Never and Rarely became one category, Sometimes and Often became one category and Always was a category. Five of the six analyses were thus conducted with 4 degrees of freedom, while this pair of variables was tested with only 2 degrees of freedom. In all cases no statistically significant associations were found, $p > .05$.

Table 11

Testing for bias on dog waste collection and use of leash as a function of how survey link was received, residency, and timing of survey submission

	Pearson x^2	*df*	*p*
Dog-waste collection			
How survey link was received	4.029[a]	4	.402
Residency	2.324[b]	2	.313
Timing of survey completion	2.178[c]	4	.703
Use of leash			
How survey link was received	2.078[d]	4	.721
Residency	7.964[e]	4	.093
Timing of survey completion	3.568[f]	4	.468

[a] 2 cells (20%) have expected count less than 5. The minimum expected count is 3.00.
[b] 0 cells (0%) have expected count less than 5. The minimum expected count is 6.42.
[c] 2 cells (20%) have expected count less than 5. The minimum expected count is 2.35.
[d] 0 cells (0%) have expected count less than 5. The minimum expected count is 11.61.
[e] 0 cells (0%) have expected count less than 5. The minimum expected count is 13.23.
[f] 0 cells (0%) have expected count less than 5. The minimum expected count is 9.09.

Research Objective One: Applying a Model of Outdoor Recreation Conflict – Descriptive Analyses of Antecedent Conflict Factors

Activity Style – Reason for Visit

The majority (62.5%) of participants ranked “To walk the dog(s)” as the most important reason for visiting a local nature trail when with a dog. Modal responses for each rank of importance are presented in Table 12 where it can be seen that the least important reason was “To do something with my family, friends”.

Table 12

Modal response for each rank of importance for visit reason when all visit reasons were ranked on importance

Rank	Visit reason	Mode	% of Valid Cases (n=261)
1 (most important)	To walk the dog(s)	163	62.5
2	To exercise, be physically active	115	44.1
3	To enjoy the landscape and nature	103	39.5
4	To experience tranquility	95	36.4
5 (least important)	To do something with my family, friends	119	45.6

Note: Participants (n=261) ranked the relative importance of these five visit reasons. This table lists the reasons in order of their most frequently assigned rank.

Table 13 presents the importance ranking of possible visit reasons for only those participants whose most important reason matched the modal most important reason (n=163) of 'To walk the dog(s)'. Their distribution of ranks mirrored that seen in Table 12 where reasons were ordered in importance based on the modal response at each rank by all participants (n=261).

Table 13

For those who ranked ‘To walk the dog(s)’ as most important reason to visit local nature trail, their modal responses for each of the other ranks of importance

Rank	Visit reason	Mode	% of Valid Cases (n=163)
1 (most important)	To walk the dog(s)	163	100.0
2	To exercise, be physically active	107	65.6
3	To enjoy the landscape and nature	75	46.0
4	To experience tranquility	69	42.3
5 (least important)	To do something with my family, friends	84	51.5

Finally, to determine whether the ranking of ‘most important visit reason’ was the representative ranking response for the reason ‘to walk the dog’, a chi-square goodness of fit test between observed frequencies for each response option and expected frequencies for each response option was conducted. Table 14 lists these frequencies and the unadjusted residuals. The distribution of observed frequencies varied significantly from the expected distribution of frequencies, x^2 (4) = 311.63, p < .001. A review of the residuals indicates that the only observed frequency larger than its expected cell frequency was the rank of 1, most important visit reason. Given that the observed frequency for ‘most important’ was more than twice the expected and was the only cell with a residual in the direction indicating that people were choosing that response more often than expected, it was accepted herein as the representative most important visit reason when visiting a local nature trail with a dog.

Table 14

Distribution of Ranking Responses for Visit Reason: ‘To Walk the Dog’—Observed and Expected Frequencies and Residual Values

Rank	Observed	Expected	Residual
1 (most important)	163	52.2	110.8
2	50	52.2	-2.2
3	19	52.2	-33.2
4	10	52.2	-42.2
5 (least important)	19	52.2	-33.2

Note: Chi-square goodness of fit test indicated significant differences between the expected distribution of responses and the observed distribution of responses, x^2 (4) = 311.63, p < .001.

Resource Specificity – Place Identity

Four survey items measuring place identity individually (see Table 15) and collectively (see Tables 16 and 17) were used to describe participant attachment to local nature trails. Table 15 lists responses for each individual item. Based on level of agreement with each attachment statement, it can be quickly seen that most participants for each item either agreed or strongly agreed with the statement. The number of participants who neither agreed nor disagreed ranged from about 10% to about 30% depending on the item. Those who disagreed or strongly disagreed were in the minority comprising only 1.5% to 4.2% of participants depending on the item.

Table 15

Place Identity: degree of agreement with statements indicating attachment

Place Identity Statement (valid cases)	Strongly Disagree	Disagree	Neither Disagree Or Agree	Agree	Strongly Agree	Row Totals
The local trails I visit most mean a lot to me						
Frequency	4	4	27	101	128	264
% of Valid Cases (n=264)	1.5	1.5	10.2	38.3	48.5	100%
I am very attached to the local trails I visit most						
Frequency	5	6	52	87	114	264
% of Valid Cases (n=264)	1.9	2.3	19.7	33.0	43.2	100%
I identify strongly with the local trails I visit most						
Frequency	6	5	60	94	98	263
% of Valid Cases (n=263)	2.3	1.9	22.8	35.7	37.3	100%
I have a special connection to the local trails I visit most and to the people who visit them						
Frequency	5	11	78	91	80	265
% of Valid Cases (n=265)	1.9	4.2	29.4	34.3	30.2	100%

Place Identity Index. In order to collectively represent the four place identity items as a single measure of attachment, a Place Identity Index was created. The method used was similar to that used to create the Compliance Index-DW. In this case however, after re-coding agree and strongly agree to 1 = 'attached' and strongly disagree, disagree, and neither to 0 = 'not attached', the Place Identity Index value could range from 0 out of four (0/4) items as 'attached' to four out of four (4/4) items attached; possible values thus included 0, .25, .50, .75 and 1.0. The closer the index value to 1.0 the greater the attachment to the trail through place identity. Table 16 lists the frequencies of attached and not attached participants for each place identity item; for each item, more participants were attached than not attached.

Table 16

Place Attachment as Measure by Place Identity Items Recoded to Attached and Not Attached Trail Visitors Walking with a Dog

	Attachment Status			
	Attached		Not Attached	
Place Identity Item (# of valid cases)	Frequency	% of Valid Cases	Frequency	% of Valid Cases
The local trails I visit most mean a lot to me (264)	229	86.7	35	13.3
I am very attached to the local trails I visit most (264)	201	76.1	63	23.9
I identify strongly with the local trails I visit most (263)	192	73.0	71	27.0
I have a special connection to the local trails I visit most and to the people who visit them (265)	171	64.5	94	35.5

Note: Attached status includes responses of Strongly Agree and Agree; Not attached status includes responses of Strongly Disagree, Disagree, and Neither.

The Place Identity Index measure indicated that over half the participants (57%) were attached when the four items were considered collectively; proportion of participants at each level of the Place Identity Index is listed in Table 17.

Table 17

Place Identity Index as a Reflection of Place Attachment

Place Identity Index Values	Frequency	% of valid cases, n=261
0.00	28	10.7
0.25	18	6.9
0.50	28	10.7
0.75	38	14.6
1.00	149	57.1

NOTE: Index values represent the proportion of four place identity items that reflected attachment. For example, 1 of 4 items with an attached status yields an index value of 0.25 while 4 of 4 items yields an index value of 1.0.

Resource Specificity – Visit frequency

Frequent visitors were categorized as those who went to local nature trails with their dog at least once a week if not daily; they constituted about 70% of participants (see Table 7 on page 128). The remaining 30% of participants visited at most every two weeks and were considered infrequent visitors. Visit frequency as frequent or infrequent significantly related to place identity as attached or not attached x^2 (1) = 16.536, p < .001, with a weak effect size Phi = .252.

Lifestyle tolerance – Human-dog Interaction as 'Problem' Behavior

For each of 12 human-dog interactions, the degree to which the interaction was perceived to be a problem, if the interaction were to occur, is listed in Table 18 through the presentation of percent of participants who responded at each level. Figure 5 provides more easily for a visual contrast of response rates per problem level for each human-dog interaction by presenting 100% stacked bar charts. Following past practice (e.g., Vaske & Donnelly, 2007), the human-dog interactions are grouped based on whether the behavior involved direct interaction between a human and a dog (e.g., a dog licking a trail visitor) or an indirect interaction (e.g., birds suddenly flying away); herein the two dog-waste related interactions, though considered indirect interactions, were considered as a third group, given the focus of the current research project. In Figure 5 the dog-waste related interactions are shown between the direct and indirect interactions.

Table 18

Perception of human-dog interactions as **problems**, if interaction were to occur

Interaction (# of valid cases)	Not a problem %	Slight problem %	Moderate problem %	Extreme problem %
Direct interaction				
Dogs jumping on a visitor (262)	6.1	26.3	32.4	35.1
Dogs pawing a visitor (259)	18.9	29.0	30.9	21.2
Dogs approaching visitors uninvited (261)	21.5	34.1	27.2	17.2
Dogs licking a visitor (260)	36.5	33.5	21.2	8.8
Dogs sniffing a visitor (262)	58.4	27.5	10.3	3.8
Indirect interaction				
Dogs causing wildlife to flee (261)	37.5	29.5	18.4	14.6
Dogs off trail (261)	57.9	20.3	12.3	9.6
Dogs 'play chasing' another dog (261)	62.5	18.8	10.0	8.8
Dogs causing birds to suddenly fly away (261)	58.6	24.5	10.3	6.5
Owners repeatedly calling their dogs (260)	45.4	33.1	15.4	6.2
Dog-waste related, indirect interaction				
Owners not picking up after their dogs (260)	2.7	12.7	27.7	56.9
Owners leaving bagged poop on trail (262)	5.0	15.3	33.2	46.6

The five interactions (in Figure 5 below) located in the top rows are considered direct interactions and the lower five are considered indirect interactions, with the middle two being dog-waste related.

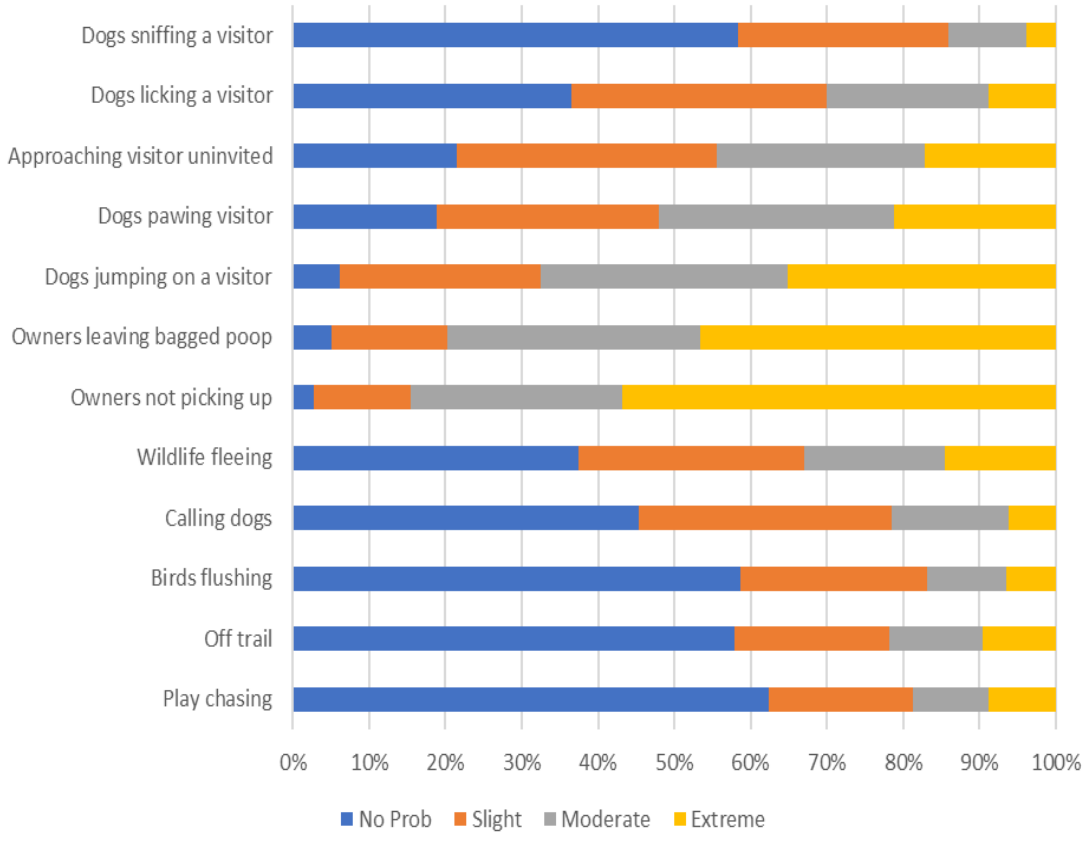


Figure 5. Horizontal 100% stacked bar-chart reflecting perceived problem levels for human-dog interactions, if they were to occur.

As can be seen in both Table 18 and Figure 5, indirect interactions were more often rated as not a problem while direct interactions were more often rated as being a moderate or extreme problem. Interactions related to dog waste, if they were to occur, were most often rated an extreme problem across all the interactions with 56.9% and 46.6% of participants respectively describing uncollected dog waste or unretrieved bagged dog waste as extreme problems. To summarize perceptions of several related human-dog interactions, indices were created.

Indices for lifestyle tolerance. Indices were created to summarize several items in a single measure. Problem perceptions for each human-dog interaction were first dichotomously coded such that any level of problem perception (i.e., slight, moderate or

extreme) was coded as "problem'; and responses of 'not at all a problem' were coded 'not a problem'. This coding strategy is modeled after Vaske and others (e.g., Vaske & Donnelly, 2007; Vaske et al, 2007) and is routinely used in the study of outdoor recreation (e.g., Gibson & Fix, 2014). Table 19 lists, by type of interaction, the frequencies for each human-dog interaction when responses were coded as problem or not a problem.

Table 19

Perceptions of Human-dog Interactions as Problems, If Interactions Were to Occur, When Recoded Dichotomously

Human-dog Interaction (# of valid cases)	Not A Problem		A Problem slight/moderate/extreme	
	Frequency	% of Valid Cases	Frequency	% of Valid Cases
Indirect interaction				
Dogs causing wildlife to flee (261)	98	37.5	163	62.5
Dogs off trail (261)	151	57.9	110	42.1
Dogs 'play chasing' another dog (261)	163	62.5	98	37.5
Dogs causing birds to suddenly fly away (261)	153	58.6	108	41.4
Owners repeatedly calling their dogs (260)	118	45.5	142	54.6
Direct interaction				
Dogs jumping on a visitor (262)	16	6.1	246	93.9
Dogs pawing a visitor (259)	49	18.9	210	81.1
Dogs approaching visitors uninvited (261)	56	21.5	205	78.5
Dogs licking a visitor (260)	95	36.5	165	63.5
Dogs sniffing a visitor (262)	153	58.4	109	41.6
Dog-waste related, indirect interaction				
Owners not picking up after dogs (260)	7	2.7	253	97.3
Owners leaving bagged poop on trail (262)	13	5.0	249	95.0

Note: Responses of "Not a problem at all" were recoded to "Not a Problem"; responses of slight, moderate, or extreme problem were recoded to "A Problem". This approach reflects that of Vaske and others (e.g., see Manning, 2011).

Using the dichotomously coded human-dog interaction data, three separate indices were then created for each type of interaction (direct, indirect, and dog-waste related) in order to represent the grouped items in one tolerance score, respectively. This was done by counting the number of items in each group that were coded 'problem' and dividing by the total number of items in that group. Consequently, for the two groups of items that each had five items (direct and indirect interactions), index values could range between zero (0 of 5 items coded as 'problem') and one (5 of 5 items coded as 'problem'). Scores closer to 0.0 indicate greater tolerance because fewer interactions, if they were to occur, were perceived to be a problem; conversely, scores closer to 1.0 indicate less tolerance because more of the interactions, if they were to occur, were perceived as problems. The tolerance index for dog-waste related interactions was similarly created and comprised of two items.

A review of Table 20 indicates that about 93% of participants perceived dog-waste not being picked up *and* bagged dog-waste being left on the ground each as at least a slight problem. In contrast, only 34.8% and 14.8% of participants deemed every item constituting the direct and indirect interaction indices as a problem (i.e., 5 of 5 interactions were coded 'problem').

Table 20

Tolerance Indices for Human-dog Interactions Were They to Occur, Grouped by Indirect, Direct, and Dog-waste-related Interactions

Human-dog Interaction Indices	Frequency	% of Valid Cases
Proportion of 5 *indirect* behaviors perceived as at least a slight a problem		
0.00	51	19.8
0.20	36	14.0
0.40	45	17.5
0.60	53	20.6
0.80	34	13.2
1.00	38	14.8
Total # of valid cases	257	100.0
Proportion of 5 *direct* behaviors perceived as at least a slight a problem		
0.00	10	3.9
0.20	14	5.5
0.40	36	14.1
0.60	47	18.4
0.80	60	23.4
1.00	89	34.8
Total # of valid cases	256	100.0
Proportion of 2 *dog-waste-related* behaviors perceived as at least a slight a problem		
0.00	2	0.8
0.50	16	6.2
1.0	242	93.1
Total # of valid cases	260	100.0

Determining Conflict Potential

Traditional conflict typing. A popular conflict typology used by outdoor recreation specialists (see Gibson & Fix, 2014; Vaske, et al, 1995; Vaske, et al, 2007;

Manning, 2011) was applied. The typology results in a 2 x 2 cross tabulation that categorizes the behavior based on whether it is perceived as a problem and whether the behavior was observed or not. This model asserts that conflict is perceived whenever any level of 'behavior as problem' is perceived; if the behavior is perceived to be a problem and is never observed the conflict is rendered a social values conflict, whereas if the behavior is deemed problematic at any level and is observed then the conflict is rendered a goal interference conflict.

Thus, considering both problem level and observed level is necessary when distinguishing between types of conflict. Table 21 presents the frequency with which participants usually *observed* such human-dog interactions during past visits to the local nature trails. As was presented in Table 18 and Figure 5, the two dog-waste related interactions, if encountered, were perceived to be an extreme problem by nearly 57% and 47% of participants. In contrast, only about 12% of participants always encountered each of the dog-waste related interactions when visiting a local trail with a dog (see Table 21). Similarly, 35% of participants reported that, if it were to occur, encountering a dog jumping on a visitor would be an extreme problem (see Table 18 and Figure 5), while only 1.2% of participants always and 7.5% often (see Table 21) encounter the interaction previously deemed problematic by over a third of participants. A graphic representation of the data in Table 21 is presented in Figure 6 to provide for an easy comparison of response patterns among observation levels of the human-dog interactions, during past visits to the local nature trails.

Table 21

Frequency of Observing Human-dog Interactions When Usually Visiting Local Trail with a Dog

Interaction (# of valid cases)	Never %	Some-times %	Often %	Always %
Direct interaction				
Dogs jumping on a visitor (255)	25.9	65.5	7.5	1.2
Dogs pawing a visitor (256)	47.3	47.3	3.5	2.0
Dogs approaching visitors uninvited (256)	7.0	61.3	21.1	10.5
Dogs licking a visitor (255)	43.1	50.2	5.9	0.8
Dogs sniffing a visitor (255)	5.5	58.8	30.2	5.5
Indirect interaction				
Dogs causing wildlife to flee (256)	39.1	53.5	6.3	1.2
Dogs off trail (255)	5.1	40.8	38.8	15.3
Dogs 'play chasing' another dog (255)	7.1	34.1	41.2	17.6
Dogs causing birds to suddenly fly away (255)	32.2	60.0	5.5	2.4
Owners repeatedly calling their dogs (255)	13.7	60.0	18.8	7.5
Dog-waste related, indirect interaction				
Owners not picking up after their dogs (256)	5.9	53.1	28.9	12.1
Owners leaving bagged poop on trail (256)	3.9	51.2	32.8	12.1

In Figure 6 below, the top five interactions are considered direct interactions and the lower seven are considered indirect interactions, with the bottom two being dog-waste related.

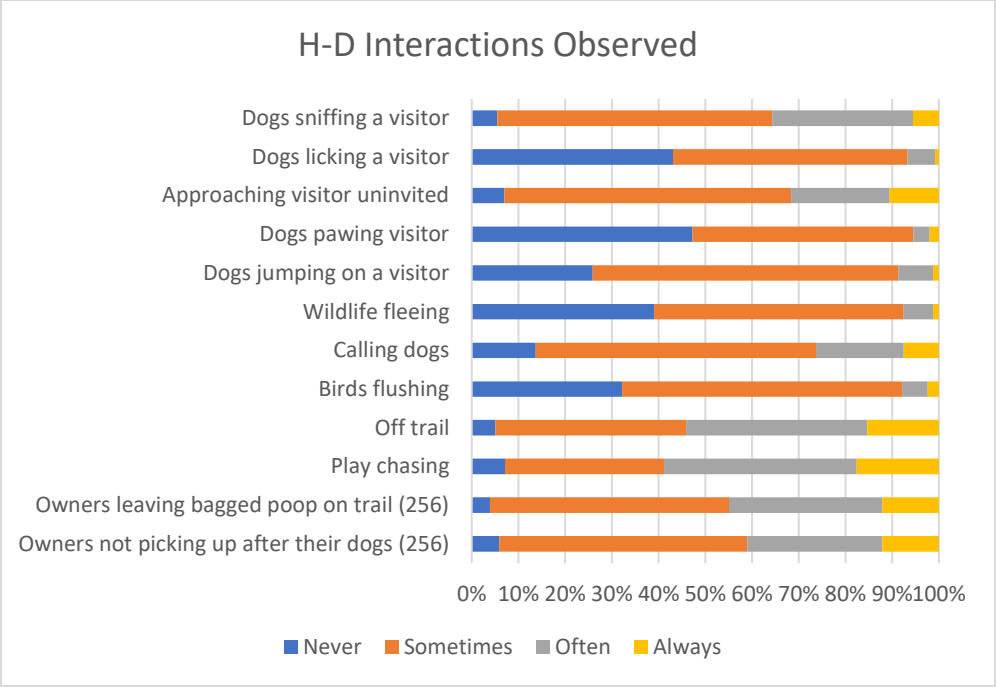


Figure 6. Horizontal 100% stacked bar-chart reflecting observation history during a typical visit to a local nature trail with a dog, for each human-dog interaction.

Using the traditional four categories for typing conflict, Table 22 lists frequencies and proportions for conflict type associated with each of the 12 human-dog interactions. Figure 7 provides a graphic representation of the data to assist visualization of the patterns of conflict types for the human-dog interactions.

Table 22

Conflict Types as Determined by Perceived Problem Status and Observation History Grouped by Type of Human-dog Interactions

Human-dog interactions (# of valid cases)	Conflict Type: No Conflict — No Problem Not Observed Freq(%)	No Conflict — No problem Observed Freq(%)	Social Values Conflict — Problem Not Observed Freq(%)	Interpersonal goal interferer Conflict — Problem Observed Freq(%)
Indirect Interaction:				
Owners repeatedly calling their dogs (n=253)	22 (8.7)	93 (36.8)	12 (4.7)	126 (49.8)
Dogs causing wildlife to flee (n=255)	35 (13.7)	61 (23.9)	64 (25.1)	95 (37.3)
Dogs causing birds to fly away (n=255)	53 (20.8)	97 (38)	29 (11.4)	76 (29.8)
Dogs off trail (n=254)	10 (3.9)	136 (53.5)	3 (1.2)	105 (41.3)
Dogs 'play' chasing another dog (n=254)	8 (3.1)	150 (59.1)	10 (3.9)	86 (33.9)
Direct Interaction:				
Dogs jumping on visitors (n=255)	7 (2.7)	8 (3.1)	59 (23.1)	181 (71.0)
Dogs pawing a visitor (n=253)	27 (10.7)	19 (7.5)	93 (36.8)	114 (45.1)
Dogs sniffing a visitor (n=255)	10 (3.9)	139 (54.5)	4 (1.6)	102 (40.0)
Dogs approaching uninvited (n=255)	5 (2.0)	50 (19.6)	13 (5.1)	187 (73.3)
Dogs licking a visitor (n=253)	35 (13.8)	58 (22.9)	75 (29.6)	85 (33.6)
Dog-Waste Related:				
Owners not picking up after their dogs (n=254)	2 (0.8)	5 (2.0)	13 (5.1)	234 (92.1)
Owners leaving bagged waste on trail (n=256)	1 (0.4)	12 (4.7)	9 (3.5)	234 (91.4)

NOTE: Problem status includes perceptions of slight, moderate, and extreme problem; Observed includes sometimes, often and always. This is typical coding used in the outdoor recreation conflict field.

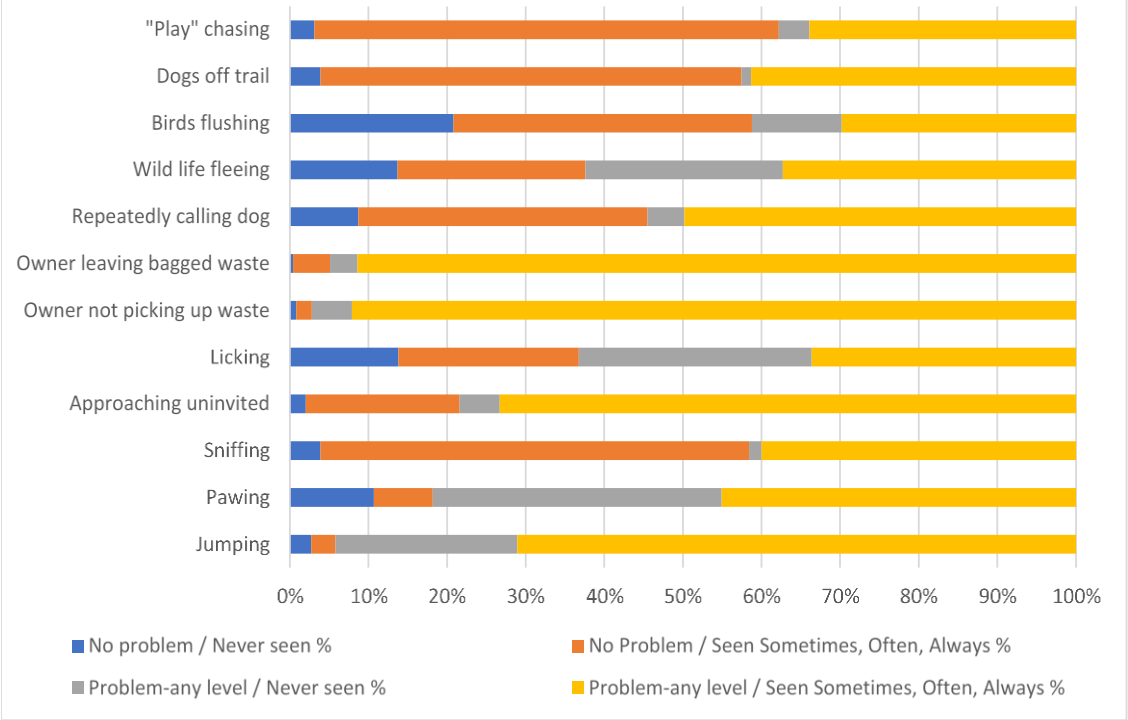


Figure 7. Horizontal 100% stacked bar-chart reflecting conventional conflict typing applied to problem perceptions *and* observation history of 12 human-dog interactions.

In Figure 7 above, the five top bars show indirect interactions; the middle two are dog-waste related, and the bottom five bars are direct interactions. Any level of problem perception was coded problem; any level of observation was coded seen. Percentages of total number of responses for respective human-dog interactions are shown.

Considering the data as presented in Table 22 and Figure 7 does not account for the degree of problem perception or the frequency of past observations. To avoid an all or none approach to characterizing conflict potential as a reflection of conflict sensitivity (problem level) combined with past exposure (frequency of past observations), categorizing the two human-dog interactions as problems and observed occurrences was revisited.

Conflict Potential Instead of Conflict Type

It was beyond the scope of the current research to assess whether participants experienced recreational conflict. However, consideration was given to perceptions of potential conflict sources as problems in combination with perceptions of how frequently these same conflict sources were encountered during past visits to local nature trails. Additionally, said consideration was given to level of intensity when coding the responses dichotomously. Only perceptions of moderate or extreme problem were coded problem; and only observation frequencies of often or always were coded as seen. Figure 8 illustrates the relative incidence of each of the four categories: not a problem and not observed or not a problem and observed (both indicate that conflict potential was non-existent or little); a problem and not observed (non-triggered sensitivity); a problem and observed (triggered sensitivity). Conflict sensitivity (i.e. problem level) plus exposure (i.e., past observations) determines conflict potential.

Among indirect human-dog interactions, those interactions with the highest frequencies for perception as problems and seen frequently (i.e., triggered sensitivity) both 'play' chasing and dogs off trail were so perceived by about 11% of participants. Among direct human-dog interactions, dogs approaching uninvited had the highest frequency for perception as problems and seen frequently (i.e., triggered sensitivity) with almost 19% of participants reporting such. In contrast, almost 39% and 40% of participants respectively perceived conflict potential rooted in the interactions of owners not collecting dog waste and owners leaving bagged dog waste on the ground as triggered sensitivity (a moderate or extreme problem, seen often).

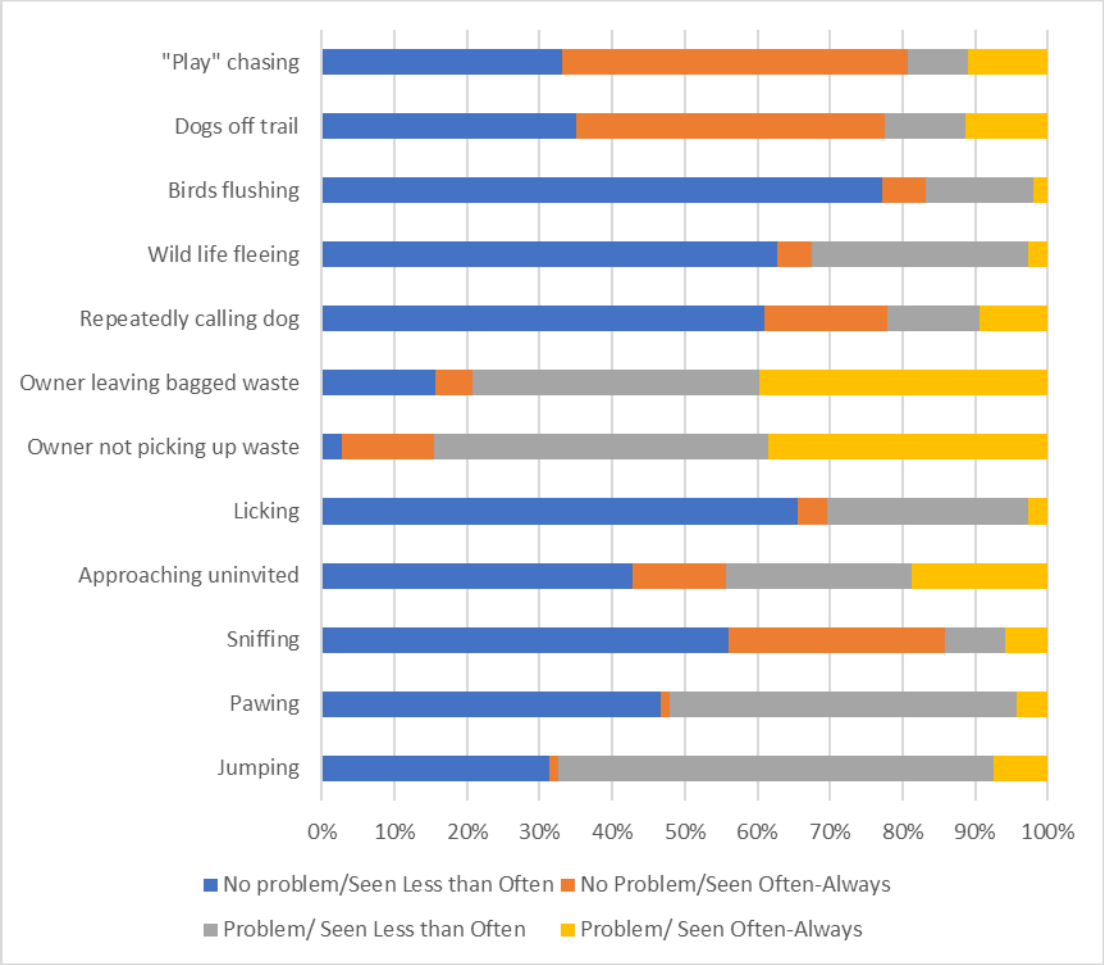


Figure 8. Horizontal 100% stacked bar-chart reflecting conflict potential as perceived problem (sensitivity) and observation history (exposure) for each human-dog interaction.

In Figure 8 above, the five top bars show indirect interactions; the middle two are dog-waste related, and the bottom five bars are direction interactions. Percentages of total number of responses for respective human-dog interactions are shown.

Research Objective One: Applying a Model of Outdoor Recreation Conflict – Inferential Analyses using Antecedent Conflict Factors and Conflict Potential

Using 2 x 2 contingency tables, chi square (x^2) tests of association were conducted to explore the relationships between each antecedent conflict factor and the two self-reported dog management measures. In all cases the null hypothesis was that the two

variables under consideration were unrelated with $p < .05$. These results are summarized in Tables 23 and 24 for tests with dog-waste collection; and in Tables 25, 26, and 27 for tests with leash use. Table 28 summarizes a Fisher's Exact analysis for test of relationship between the antecedent conflict factor, lifestyle tolerance as problem perception for dog-waste related, human-dog interactions and leash use. Fisher's Exact was used for this one pairing because it violated the assumption for expected cell counts in a chi-square test.

Table 23

Tests of Association Between Antecedent Conflict Factors and Dog-Waste Collection

Antecedent Conflict Factor	x^2	*df*	Asymp significance (2 sided)
Activity Style – Motivation (Visit Reason)	7.692[a]	1	.006*
Resource Specificity – Place Attachment (Place Identity)	.201[b]	1	.654
Resource Specificity – Visit Frequency	11.10[c]	1	.001**
Lifestyle Tolerance – Problem Perception (Human-Dog Interaction)			
Direct	2.032[d]	1	.154
Indirect	3.020[e]	1	.082
Dog-waste Related	.208[f]	1	.649

Note. Dog-Waste Collection Index was dichotomously recoded such that when responses to both index items were always, the index score was coded consistent collector; if both responses were not always then the index score was coded inconsistent collector.

[a] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 37.55
[b] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 29.60
[c] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 33.54
[d] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 23.29
[e] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 49.80
[f] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.09

*p < .01 effect size Phi = .172
**p < .001 effect size Phi = .198

Dog-waste Collection and Antecedent Conflict Factors

The antecedent conflict factor, activity style (motivation as visit reason) was first dichotomized to indicate that the response was or was not the representative most important reason of 'to walk the dog(s)'. Visit reason was related to dog-waste collection practices as measured by the Dog-Waste Collection Index dichotomously re-coded to consistent collector or inconsistent collector. The null hypothesis in this case was rejected, x^2 (1) = 7.692, p < .01. The magnitude of the effect however was small (Phi = .172). To better understand the significant relationship between the two variables, an odds ratio analysis was conducted. Table 24 includes the 2 x 2 contingency table for visit reason and dog-waste collection. Visitors who ranked their most important visit reason as to walk the dog were about half as likely (odds ratio analysis: (90/73)/(71/27) = 0.48) to report consistently collecting dog waste than those who ranked a different response as most important visit reason.

Table 24

Cross-Tabulation of Responses for Significantly Associated Antecedent Conflict Factors and Dog-Waste Collection

Antecedent Conflict Factor	Dog-Waste Collection (frequency)		
	Consistent	Inconsistent	Total
Activity style - motivation Most important visit reason			
To walk the dog(s)	90	73	163
Something other than to walk the dog(s)	71	27	98
Total	161	100	261
Resource specificity – visit frequency			
Frequently (at least 1 x week)	107	92	199
Infrequently (less than twice per month)	63	21	84
Total	170	113	283

Note: Self-reported dog-waste collection frequencies were recoded to 'consistent' when response was 'always'; Dog-waste Collection Index was recoded to 'consistent' when index score = 1.

Scores for the Place Identity Index as a measure of the antecedent conflict factor resource specificity were first coded dichotomously to indicate attached (.75 and 1.0) and not attached (0, 0.25 and 0.5) then tested for association with the dog-waste collection. Chi-square test results appear in Table 23; the null hypothesis was not rejected; place identity did not relate with dog-waste collection. For resource specificity measured as visit frequency, however, a significant relationship was seen with dog-waste collection. Table 24 includes the 2 x 2 contingency table for visit frequency and dog-waste collection. For infrequent visitors, the odds were 2.59 times higher that dog waste was consistently (always) picked up than the odds of consistently picking up by frequent visitors. (Odds ratio analysis: (63/21) / (107/92) = 2.59.)

Finally, the antecedent conflict factor of lifestyle tolerance as measured by indices for direct, indirect or dog-waste related human-dog interactions did not associate with dog-waste collection, respectively (see Table 23).

Leash Use and Antecedent Conflict Factors

As seen in Table 25, activity style as visit reason was related to leash use, x^2 (1) = 11.153, p < . 001. The strength of the relationship however was weak (Phi = .207). Resource Specificity as Place Identity did not relate to leash use; the null hypothesis was not rejected, p > .05. Tolerance for *indirect* human-dog interactions was related to leash use, x^2 (1) = 24.590, p < .001. The effect size was of moderate strength, Phi = .310. Tolerance for *direct* human-dog interactions was not associated with leash use, p > .05, thus the null hypothesis was not rejected for this variable pairing (See Table 25).

Table 25

Tests of Association Between Antecedent Conflict Factors and Self-reported Leash Use During Visit to Nature Trail

Antecedent Conflict Factor crossed with Leash Use	x^2	*df*	Asymp significance (2 sided)	Effect size Phi
Activity Style – Motivation (Visit Reason)	11.153[a]	1	.001*	.207
Resource Specificity – Place Attachment (Place Identity)	2.401[b]	1	.121	--
Resource Specificity – Visit Frequency	12.07[c]	1	.001*	.207
Lifestyle Tolerance – Problem Perception (Human-Dog Interaction)				
Direct	3.216[d]	1	.073	--
Indirect	24.590[e]	1	.001*	.310

Note. The leash use index was dichotomized as consistent user (used leash for full duration of visit) and as inconsistent user (used leash for less than full duration of visit or not at all).

[a] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 25.53.
[b] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 19.07.
[c] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 21.37.
[d] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.29.
[e] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 31.74.

* $p \leq .001$

To better understand the nature of the relationship between the two variables in each statistically significant pairing in Table 25 and their respective effect sizes, odds ratio analyses were conducted using the respective 2 x 2 contingency tables presented in Tables 26 and 27. Participants who ranked their most important visit reason as to walk the dog were about 40% less likely (odds ratio analysis per Table 26: (31/132) / (37/61) = 0.39) to report using a leash with their dog for the *full* duration of their nature trail visit than those who ranked a different response as most important visit reason. Participants who frequently visited a local nature trail with a dog were 37% less likely (per Table 26

odds ratio analysis: (39/160) / (33/51) = 0.37) to report using a leash with their dog for the full visit duration than the odds for those who infrequently visited. Regarding the significant association between tolerance for indirect human-dog interactions and leash use as reported in Table 25, the odds of using a leash for the full duration visit are 4.65 times higher (per Table 27 odds ratio analysis: (49/76) / (16/115) = 4.65) when tolerance for indirect human-dog interactions was lower than when tolerance was greater.

Table 26

Contingency Table for Significantly Associated Antecedent Conflict Factors and Leash Use During Visit to Nature Trail

	Level of Leash Use During A Nature Trail Visit		
Antecedent Conflict Factor	Consistent (full visit duration)	Inconsistent (less than full visit duration)	Total
Activity style - motivation Most important visit reason			
To walk the dog(s)	31	132	163
Something other than to walk the dog(s)	37	61	98
Total	68	193	261
Resource specificity – visit frequency			
Frequent (at least 1 x week)	39	160	199
Infrequent (less than twice per month)	33	51	84
Total	72	211	283

Table 27

Contingency Table for the Significantly Associated Antecedent Conflict Factor, Lifestyle Tolerance: Indirect Human-Dog Interactions and Leash Use During Visit to Nature Trail

Level of Human-Dog Indirect Interactions Perceived as Problems	Leash Use During Trail Visit		
Indirect interactions	Full visit duration	Less than visit duration	Total
Less tolerant (≥ 3 deemed at least a slight problem)	49 39.2%	76 60.8%[a]	125 100%
More tolerant (≤ 2 deemed at least a slight problem)	16 12.2%	115 87.8%	131 100%

[a] Percentage is for rows

Leash use and antecedent conflict factors: tolerance for dog-waste related human-dog interactions. The assumption for the chi square test of independence regarding the acceptable number of cells in a contingency table with expected values less than 5 was violated in the 2 x 2 contingency table for lifestyle tolerance as problem perception of dog-waste related, human-dog interactions compared with leash use during a nature trail visit. Consequently, this pairing was omitted from Table 25. One of four cells (25%) had an expected count less than 5 which exceeds the acceptable maximum percentage of cells (20%) that may have expected counts less than 5 (Field, 2013). Fisher's Exact Test was used instead to consider the null hypothesis that the variables are unrelated, that is, the probability of using a leash for the entire duration of a trail visit is the same regardless of problem perception of dog-waste related, human-dog interactions. (Field, 2013; Kim, 2017; McDonald, 2014). Table 28 presents observed cell frequencies and percentages for the 2 x 2 contingency table for the variables: antecedent conflict factor of lifestyle tolerance as problem perception of dog-waste related, human-dog

interactions, and leash use during a nature trail visit. Fisher's Exact probability was 1.0, $p > .05$ thus the null hypothesis cannot be rejected.

Table 28

Contingency Table for Antecedent Conflict Factor, Lifestyle Tolerance (Problem Perception for Dog-waste Related Interactions) and Leash Use During Visit to Nature Trail

Problem Perceptions for Human-Dog Interactions	Leash Use During Trail Visit		
Dog-waste related interactions	Less than visit duration	Entire visit duration	Total
Less of a problem (more tolerant)	14 77.8%	4 22.2%	18 100%
More of a problem (less tolerant)	179 74.3%	62 25.7%	241 100%

A low odds ratio (1.21, CI = 0.39, 3.8) is consistent with the generated Fisher's Exact *probability* value of 1.0 which indicates that the value for level of leash use does not depend on the value of problem perception of interactions related to dog waste. As can be seen in Table 28, the column percentages in the cells are comparable regardless of level of problem perception. The null hypothesis is not rejected. The likelihood of leashing for duration of a trail visit is the same regardless of tolerance level for dog-waste related, human-dog interactions; similarly, the likelihood of leashing for less than the full duration of the trail visit is the same regardless of tolerance level for dog-waste related, human-dog interactions.

Conflict Potential and Antecedent Conflict Factors

Tests of association between antecedent conflict factors and conflict potential indicated that all but activity style (measured as most important visit reason) related to conflict potential rooted in uncollected dog waste. Table 29 lists the results of the respective chi-square tests. Effect size was measured using Cramer's *v* as is the convention when contingency tables are larger than 2 x 2 (Field, 2013). In every case, the strength of the statistically significant relationship was weak (i.e., Cramer's $v < .30$).

Table 29

Tests of Association Between Antecedent Conflict Factors and Conflict Potential Rooted in Uncollected Dog Waste

Antecedent Conflict Factor crossed with Conflict Potential	x^2	*df*	Asymp significance (2 sided)	Effect size Cramer's *v*
Activity Style – Motivation (Visit Reason)	4.006[a]	2	.135	--
Resource Specificity – Place Attachment (Place Identity)	6.984[b]	2	.030[*]	.167
Resource Specificity – Visit Frequency	7.305[c]	2	.026[*]	.170
Lifestyle Tolerance – Problem Perception (Human-Dog Interaction)				
Direct	11.907[d]	2	.003[**]	.219
Indirect	11.830[e]	2	.003[**]	.218

Note. Dichotomized antecedent conflict factors tested for association with conflict potential (perceptions of uncollected dog waste as a problem and frequency of past exposure). Three categories of conflict potential were used: minimal potential (action perceived as slight or not at all a problem *and* may have been seen or not seen), non-triggered sensitivity (action is perceived as a moderate or extreme problem *and* not seen or seen only sometimes), triggered sensitivity (action is perceived as a moderate or extreme problem and seen often or always).

[a] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 14.84.
[b] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.68.
[c] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.06.
[d] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.63.
[e] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.49.

* $p < .05$
** $p < .01$

A statistically significant relationship was also observed between conflict potential rooted in uncollected dog waste and dog-waste collection practices, x^2 (2) = 37.54, p < .001; and the strength of the relationship was moderately strong, Cramer's v = .385.

To better understand the nature of significant relationships in omnibus chi-square tests, post hoc analyses are required (as have been performed herein through odds ratio analyses). However, with a 3 x 2 contingency table, it is more challenging to understand the relationships between and among a variable at one level and a variable at another (Field, 2013). A logistical decision was made to invest resources into determining which row-column combinations are strong contributors to the overall significant chi-square statistic rather than invest resources into conducting multiple odds ratio analyses per test. Indeed, Field (2013) argued that the 2 x 2 contingency table is best suited for odds ratio analyses, interpreting larger tables through such methods is less conducive. Additionally, in the context of weak relationships, the difference between the odds of one response pattern and another is typically not great.

Following the guidance of Sharpe (2015), adjusted standardized residuals were reviewed to determine which row-column pairings contributed to the significant finding. Adjusted standardized residuals account for row and column totals, and will be normally distributed, such that their mean will be 0 and standard deviation 1.0 (IBM, 2018; Sharpe, 2015). As with standardized residuals, adjusted standardized residuals that exceed the bounds of +/- 1.96 (from 0) can be said to be statistically significant (Field, 2013; IBM, 2018; Sharpe, 2015). A statistically significant finding in this context thus indicates that the row-column pairing produced an observed frequency that varies from the expected

frequency for that row-column pairing under the null hypothesis (which is that the variables are unrelated).

Based on such an approach, Table 30 provides a visual summary of the strong contributors to the statistically significant omnibus chi-square results when testing for relationship between conflict potential and the ORCM antecedent conflict factors and with dog-waste collection practices. A verbal description of these findings follows.

Table 30

Patterns of Relationship Under the Null Hypothesis for Those Antecedent Conflict Factors that Significantly Associated with Conflict Potential Rooted in Uncollected Dog Waste and for Dog-Waste Collection and Conflict Potential

	Conflict Potential		
ORCM Antecedent Conflict Factor	As triggered sensitivity	As non-triggered sensitivity	As little potential
Resource Specificity			
Place Identity Attachment - greater	<	>	n. s.
Place Identity Attachment - lower	>	<	n. s.
Visit frequency - frequent	<	n. s.	>
Visit frequency - infrequent	>	n. s.	<
Lifestyle Tolerance			
Tolerance for *direct* interactions - greater	<	n. s.	>
Tolerance for *direct* interactions - lesser	>	n. s.	<
Tolerance for *indirect* interactions - greater	<	>	n. s.
Tolerance for *indirect* interactions - lesser	>	<	n. s.
Dog-Waste Collection Practices			
Consistently picks up dog waste	>	n. s.	<
Inconsistently picks up dog waste	<	n. s.	>

Note. Post hoc analyses of statistically significant chi-square tests of association between conflict potential and antecedent conflict factors or dog-waste collection practices consisted of review of adjusted standardized residuals for strong contributors to the chi-square statistic. The symbol > indicates that the row-column pairing had a frequency greater than what would be expected under the null hypothesis that the two variables are unrelated; The symbol < indicates that the row-column pairing had a frequency less than what would be expected under the null hypothesis that the two variables are unrelated; n. s. indicates that the frequency count was not significantly different from what would be expected under the null hypothesis.

The review of adjusted standardized residuals determined that among participants for whom conflict potential was non-triggered sensitivity (the source of conflict is perceived to be a moderate or extreme problem and it was never seen or seen only sometimes), a greater number than expected indicated being more attached to place than would be expected if the two variables were unrelated and fewer reported being less attached than would be expected; among those for whom conflict potential was greater as indicated by triggered sensitivity (the source of conflict is perceived to be a moderate or extreme problem and was seen often or always), more participants reported being less attached to place than would be expected and fewer participants than expected reported being more attached. Among those with the least conflict potential (the source of conflict is perceived to be a slight or not a problem and may have been seen frequently or infrequently), the numbers reporting more attachment or less attachment were comparable to what would be expected under the null hypothesis that the two variables are unrelated.

Regarding visit frequency, among those for whom conflict potential was non-triggered sensitivity, the numbers reporting visiting frequently (at least once per week) or infrequently (no more than every two weeks) were what would be expected under the null hypothesis that the two variables are unrelated. Among those with greatest conflict potential (triggered sensitivity) more participants visited infrequently than would be expected and fewer visited frequently than would be expected; among those with least conflict potential, a greater number visited frequently than would be expected and fewer visited infrequently.

Regarding tolerance for *direct* human-dog interactions, among those for whom conflict potential was non-triggered sensitivity, the numbers reporting more tolerance (the number of human-dog interactions perceived as problems of moderate or extreme intensity were fewer) or less tolerance (the number of human-dog interactions perceived as problems of moderate or extreme intensity were greater) were what would be expected under the null hypothesis that the two variables are unrelated. Among those with greatest conflict potential (triggered sensitivity), a greater number than would be expected indicated less tolerance, while fewer than expected indicated more tolerance under the null hypothesis that the two variables are unrelated. Among those with least conflict potential, a greater number of participants than would be expected indicated more tolerance and a lower number than would be expected indicated less tolerance.

Regarding the antecedent conflict factor of tolerance for *indirect* human-dog interactions, among those for whom conflict potential was non-triggered sensitivity, the numbers reporting more tolerance were greater than expected and the numbers reporting less tolerance were fewer than expected under the null hypothesis that the two variables are unrelated. Among those with greatest conflict potential (triggered sensitivity) fewer than would be expected indicated more tolerance for indirect human-dog interactions while more than would be expected indicated less tolerance for same. Among those with least conflict potential, the numbers reporting more tolerance or less tolerance were comparable to what would be expected under the null hypothesis that conflict potential and tolerance for indirect human-dog interactions are unrelated.

Conflict Potential and Dog-waste Collection

Finally, regarding the significant relationship between dog-waste collection and conflict potential listed in Table 30, among those for whom conflict potential was non-triggered sensitivity, the numbers reporting collecting dog waste consistently (always) or inconsistently (less than always) were what would be expected under the null hypothesis that the two variables are unrelated. Among those with greatest conflict potential (triggered sensitivity) more participants collected consistently than would be expected and fewer collected inconsistently than would be expected; among those with least conflict potential, fewer than expected collected consistently than would be expected and a greater number collected inconsistently than would be expected under the null hypothesis.

Research Objective Two: Applying the Health Belief Model – Descriptive Analyses

For each HBM construct (threat, benefit, barrier, cue to act: messenger and cue to act: media) as they relate to the behavior of collecting and disposing of dog waste, frequency counts per option with corresponding proportions are reported in Table 31. A review of open-ended responses to the option ‘other’ indicated that an additional response option for the HBM factor barrier may have been overlooked during the design of the survey because of the number of participants who described it in their open-ended response.

Participants who selected ‘other’ as an indicator for an HBM factor were required in the online setting to provide an open-ended description of the thing to which ‘other’ referred. These responses are presented for each HBM factor in Appendix G, grouped by the code that was assigned to them during the manual coding process. For the HBM

construct of barrier, the ‘other’ option was selected by nearly 33% of participants (n = 86). Over half of these participants (n = 48) indicated that the barrier to cleaning up after their dog was the fact that the dog is off trail or off in the woods/brush/weeds when defecating or that they are able to move the waste off trail and into areas where people do not walk. The remaining ‘other’ responses were a mix of descriptions ranging from loose stools to bad weather to avoiding the use of plastic bags in deference to environmental concerns. Similarly, responses as ‘other’ for the remining four HBM factors were a mix of reasons with only about 11% or fewer of the participants selecting the ‘other’ option in each instance. The review of the open-ended descriptions for ‘other’ also indicated that an occasional response was encompassed by an existing option; even so, these responses remained under the ‘other’ option.

Referencing Table 31, the frequencies of modal responses appear to be meaningfully larger than the frequencies for the remaining response options. To test this, inferential analyses were conducted and subsequently a representative indicator for each HBM factor was determined.

Table 31

The HBM: Threat, Benefit, Barrier, and Cues to Act Relative to Dog-Waste Collection

Elements of the Health Belief Model (# of valid cases)	Frequency	% of Valid Cases
Threat from leaving dog waste on the ground (265)		
Natural water sources will be polluted	34	12.8
A fine from the Town	11	4.2
Other dogs can get sick from it	10	3.8
Failing to be courteous to others	191*	72.1*
Children can get sick from it	3	1.1
Other	13	4.9
I don't know	3	1.1
Benefit of picking up and disposing of dog waste (267)		
Other Dogs or people won't get sick from it	39	14.6
Elimination of unsightly dog waste	47	17.6
People won't step in it	99*	37.1*
Water sources won't be polluted by it	40	15.0
Elimination of foul-smelling dog waste	10	3.7
Other	31	11.6
I don't know	1	0.4
Barrier to picking up and disposing of dog waste (262)		
It's not a big deal to leave it	8	3.1
I don't have a bag handy	114*	43.5*
It's gross and stinky	1	0.4
I am too busy	2	0.8
No trash bins nearby	39	14.9
Other	86	32.8
I don't know	12	4.6
Cue to Act: Messenger (265)		
The owner of the land	10	3.8
Another trail visitor	23	8.7
Another trail visitor walking with a dog	59	22.3
Land steward/ someone responsible for trail upkeep	110*	41.5*
Other	28	10.6
I don't know	35	13.2
Cue to Act: Media (267)		
A portable bag dispenser that I carry	14	5.2
Social media posts	2	0.7
Bags conveniently available at trail	64	24.0
Waste-bins for dog waste conveniently located at trail	133*	49.8*
Signs or images on the trail	18	6.7
Phone App that sends reminder when on trail	1	0.4
Other	27	10.1
I don't know	8	3.0

*****These values indicate the mode response for each HBM construct.

Research Objective Two: Applying the Health Belief Model – Inferential Analyses

Chi-square goodness-of-fit tests were first conducted to determine whether the distribution of responses for each HBM factor were evenly distributed as they would be if the distribution was due to chance. In all tests for goodness of fit, the null hypothesis was rejected, $p < .001$; results are summarized in Table 32.

Table 32

Observed Response Distribution for HBM Constructs in Chi-square Goodness-of-Fit Tests with Chance Distributions

Elements of the Health Belief Model (# of valid cases)	x^2	*df*	Asymptotic Significance
Threat from leaving dog waste on the ground (265)	739.962[a]	6	.000*
Benefit of picking up and disposing of dog waste (267)	157.536[b]	6	.000*
Barrier to picking up and disposing of dog waste (262)	329.153[c]	6	.000*
Cue to Act: Messenger (265)	147.506[d]	5	.000*
Cue to Act: Communication Medium (267)	425.225[e]	7	.000*

[a]0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 37.9.
[b]0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 38.1.
[c]0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 37.4.
[d]0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 44.2.
[e]0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 33.4.

*p < .001

Determining Representative Indicators

For each HBM construct, a post-hoc analysis (following guidance from both Field, 2013 and Sharpe, 2015) of positive standardized residuals that fell beyond 1.96 was used to identify those cells (i.e., response options) that had a statistically significant frequency greater than expected, under the null hypothesis and therefore contributed to the significant chi-square test statistic. Of note, for the HBM factor barrier, when the 'other' response option was divided into dog/dog waste is off trail (n = 48) and

miscellaneous other (n = 38), neither was a statistically significant contributor to the chi-square statistic based on standardized residual analysis.

For threat, benefit and barrier, no response frequency other than the modal response was statistically significant in a positive direction from the expected frequency for that response. For each cue to act item (messenger and media), frequencies for two response options contributed to the significant chi-square test statistic. The one that contributed to a greater degree was selected as the representative indicator. The greatest contributor to a distribution that did not reflect chance was the representative indicator for each HBM factor. As asterisked in Table 31, the representative indicators were:

- Threat from leaving dog waste on the ground = Failing to be courteous to others
- Benefit of picking up and disposing of dog waste = People won't step in it
- Barrier to picking up and disposing of dog waste = I don't have a bag handy
- Cue to Act: Messenger = Land steward/ someone responsible for trail upkeep
- Cue to Act: Communication Media = Waste-bins for dog waste conveniently located at trail

Exploring Relationships Between HBM Factors and Dog-waste Collection

To determine whether there was relationship between each of the representative indicators for the HBM constructs of threat, benefit, barrier, cue to act: messenger and cue to act: media and self-reported dog waste collection practices, five separate 2 x 2 chi-square tests were conducted, $p < .05$. Table 33 presents the results of these tests. As can be seen, only the representative indicator for barrier (I don't have a bag handy) was related to self-reported dog waste collection as measured by the dog-waste collection

index, recoded dichotomously to consistent or inconsistent collector, x^2 (1) = 10.032, p = .002, with small effect size, Phi = .196.

Table 33

Tests of Association between Representative Indicators of HBM factors for the Behavior of Picking up and Disposing of Dog Waste with Self-reported Dog-waste Collection Practices

Representative Indicator of HBM Factor: Present or Absent tested with Dog-Waste Collection Index: Consistent or Inconsistent Collector (# of valid cases)	x^2	*df*	Asymptotic Significance (2-sided)
Threat from leaving dog waste on the ground: Failing to be courteous to others	1.636[a]	1	.201
Benefit of picking up and disposing of dog waste: People won't step in it	2.067[b]	1	.151
Barrier to picking up and disposing of dog waste: I don't have a bag handy	10.032[c]	1	.002*
Cue to Act – Messenger: Land steward/ someone responsible for trail upkeep	.868[d]	1	.352
Cue to Act – Media: Waste-bins for dog waste conveniently located at trail	.063[e]	1	.802

Note. Status of HBM factors as present indicated that the representative indicator was the response; absent indicated that the representative indicator was not the response. The Dog-Waste Collection Index was dichotomously recoded. Scores of 1.0 were coded consistent collector; scores of 0.5 and 0 were coded inconsistent collectors. Consistent collectors *always* picked up dog waste and *never* left bagged waste unretrieved.

[a] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 29.43.
[b] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 39.45.
[c] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 45.43.
[d] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 43.35.
[e] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 53.00.

*p < .01, with effect size Phi = .196

An odds ratio analysis helps to understand a significant association between two dichotomous variables such as between the representative indicator for barrier and dog-waste collection. Using the frequencies in contingency table in Table 34, an odds ratio analysis yielded (81/33) / (76/71) = 2.30. Thus, the odds are 2.3 times higher, for those perceiving no bag handy as the barrier to cleaning up after their dog, that they will consistently collect dog waste than the odds for those who perceive the barrier to be something other than having a bag handy.

Table 34

Contingency Table for Significantly-Associated Representative Indicator for HBM – Barrier and Self-reported Dog-Waste Collection Practices

Status of HBM barrier – no bag handy	Dog-Waste Collector Status		
	Inconsistent	Consistent	Total
Not present	71	76	147
Present	33	81	114
Total	104	157	261

Note: Status of HBM barrier was coded as present when response was "I don't have a bag handy" thus consistent with the representative indicator for that factor; consistent dog waste collector was defined as an always response to each item in the Dog-Waste Collection Index. Consistent collectors *always* picked up the waste and never left bagged waste unretrieved.

Research Objective Three: ORCM Antecedent Conflict Factors and HBM Factors

Each antecedent conflict factor was individually tested for association with the representative indicator for each HBM construct. Table 35 presents results of 2 x 2 chi-square tests of association for the antecedent conflict factors of activity style and resource specificity, $p < .05$; Table 36 presents the same for lifestyle tolerance. For activity style and resource specificity, the null hypothesis stated that each antecedent conflict factor

was respectively unrelated to the representative indicators of the HBM factors. As listed in Table 35, none of the tests of association were statistically significant, thus the null hypothesis was not rejected for any of the variable pairings.

Table 35

Tests of Association between Antecedent Conflict Factors (Activity Style and Resource Specificity) and Representative Indicators of HBM Factors for the Recommended Behavior of Dog Waste Collection and Disposal

Antecedent Conflict Factor crossed with Representative Indicators for HBM Factors	x^2	*df*	*Asymptotic p (2-sided)*
Activity Style			
Motivation as Most Important Visit Reason: To walk dog(s)			
Threat – Failing to be courteous	.624	1	.430
Benefit – Won't step in it	.015	1	.903
Barrier – No bag handy	.258	1	.612
Reminder – Land Steward	.441	1	.507
Reminder – Bins for dog waste	.204	1	.652
Resource Specificity			
Place Attachment as Place Identity			
Threat – Failing to be courteous	.277	1	.599
Benefit – Won't step in it	.069	1	.792
Barrier – No bag handy	.438	1	.508
Reminder – Land Steward	.324	1	.569
Reminder – Bins for dog waste	.056	1	.814
Visit Frequency			
Threat – Failing to be courteous	.698	1	.403
Benefit – Won't step in it	1.291	1	.256
Barrier – No bag handy	.281	1	.596
Reminder – Land Steward	3.734	1	.053
Reminder – Bins for dog waste	3.403	1	.065

Regarding the antecedent conflict factor of lifestyle tolerance, index values were recoded to account for level of problem perception. Before testing for association between lifestyle tolerance and the HBM factors, the previous measure of lifestyle tolerance as perception of human-dog interactions as problems was adjusted to distinguish between perceptions of 'less of a problem' and 'more of a problem' rather than between 'problem' and 'not a problem'. Thus, perceptions of human-dog interactions that were not a problem or a slight problem were grouped together while perceptions of moderate or extreme problem were grouped together for purposes of testing for relationship with the representative indicators of the HBM.

Perceptions of human-dog interactions as problems continued to be indexed by type of interaction: direct, indirect, or dog-waste related and served as a measure of lifestyle tolerance. The null hypothesis stated that the antecedent conflict factor of lifestyle tolerance as represented in three distinct indices and the representative indicators of the HBM factors were unrelated, $p < .05$. None of the pairings with either the *direct or indirect* indices were statistically significant. Thus, the null hypothesis that the variables are unrelated could not be rejected. (See Table 36.)

In contrast, lifestyle tolerance, as problem perception of human-dog interactions that were *dog-waste related*, was associated with representative indicators for two of the HBM factors. Lifestyle tolerance *dog-waste related* was associated with benefit (Won't step in it), x^2 (1) = 5.399, p = .020 and with barrier (No bag handy), x^2 (1) = 8.200, p = .004. The null hypothesis was rejected in these two cases. In both, however, the effect size of the association between variables was small, Phi = .144 and .179, respectively (see Table 36).

Table 36

Tests of Association Between Recoded Antecedent Conflict Factor, Lifestyle Tolerance, and Representative Indicators of HBM Factors for the Recommended Behavior of Dog-Waste Collection & Disposal

Tolerance Index for Human-dog Interaction x Representative Indicators of HBM Factors	x^2	*df*	Asymptotic significance (2-sided)
Lifestyle Tolerance as Problem Perceptions of Human-Dog *Direct* Interactions x			
Threat – Failing to be courteous	2.179	1	.099
Benefit – Won't step in it	.608	1	.435
Barrier – No bag handy	.756	1	.385
Reminder – Land Steward	.169	1	.681
Reminder – Bins for dog waste	.791	1	.374
Lifestyle Tolerance as Problem Perceptions of Human-Dog *Indirect* Interactions x			
Threat – Failing to be courteous	.728	1	.393
Benefit – Won't step in it	1.832	1	.176
Barrier – No bag handy	.191	1	.662
Reminder – Land Steward	.309	1	.578
Reminder – Bins for dog waste	1.611	1	.204
Lifestyle Tolerance as Problem Perception of Human-Dog *Dog-waste Related* Interactions x			
Threat – Failing to be courteous	.167	1	.683
Benefit – Won't step in it	5.399	1	.020*
Barrier – No bag handy	8.200	1	.004**
Reminder – Land Steward	.331	1	.565
Reminder – Bins for dog waste	.088	1	.767

*p < .05, effect size Phi = .144
**p < .01, effect size Phi = .179

Note: Items comprising each of the three tolerance indices were recoded to reflect the level of problem perception such that interactions were coded a problem if the response was moderate or extreme problem; items were coded not a problem if the response was not at all a problem or a slight problem. Indices were then calculated to reflect the proportion of items that were coded a problem. Finally, direct and indirect indices were dichotomously coded: values $\geq$ .60 were coded as problem (less tolerant); values < .60 were coded as less of a problem (more tolerant). Dog-waste related index was coded less tolerant if both index items were perceived as moderate or extreme problems and coded more tolerant if neither or only one of the items was perceived as moderate or extreme.

Tolerance for human-dog interactions *dog-waste related* was significantly related to the representative indicator for HBM benefit, with a small effect size further understood as the odds of perceiving benefit as 'people won't step in it' being 1.9 times higher for those with greater tolerance for human-dog interactions that were dog-waste related, than the odds for those who perceived such human-dog interactions with less tolerance. Table 37 reflects the frequencies used for the odds ratio analysis: (37/40) / (60/123) = 1.90.

Table 37

Frequencies for the Significantly-Associated Recoded Antecedent Conflict Factor Tolerance for Dog-waste Related Interactions and Representative Indicator for Benefit of Cleaning Up After a Dog

Antecedent conflict factor: tolerance for dog-waste related, human-dog interactions	Representative indicator for Benefit: People won't step in it		
	Present	Not present	Total
Greater tolerance	37	40	77
Lower tolerance	60	123	183
Total	97	163	260

Note: Greater tolerance indicates participants who perceived no problems or slight problems or only one interaction as moderate or extreme problem. Lower tolerance was used to identify participants who perceived both dog-waste related interactions to be moderate or extreme problems were they to occur.

Using the frequencies in Table 38, the small effect size of the relationship between lifestyle tolerance dog-waste related and barrier was further understood using an odds ratio analysis. The odds of perceiving barrier as 'no bag handy' (the representative indicator for the HBM factor barrier) were about 40% less for those with greater

tolerance for dog-waste related, human-dog interactions than the odds for those with lower tolerance of same. (Odds ratio analysis: (23/53) / (89/90) = 0.43.) Restating this in the alternative, the odds are 2.3 times higher for those with lower tolerance for dog-waste related interactions to perceive barrier as 'no bag handy'. (Odds ratio analysis: (89/90) / (23/53) = 2.3.)

Table 38

Frequencies for the Significantly-Associated Recoded Antecedent Conflict Factor Tolerance for Dog-waste Related Interactions and Representative Indicator for Barrier of Cleaning Up After a Dog

Antecedent conflict factor: tolerance for dog-waste related, human-dog interactions	Representative indicator for Barrier: No bag handy		
	Present	Not present	Total
Greater tolerance	23	53	76
Lower tolerance	89	90	179
Total	112	143	255

Note: Greater tolerance indicates participants who perceived no problems or slight problems or only one interaction as moderate or extreme problem. Lower tolerance was used to identify participants who perceived both dog-waste related interactions to be moderate or extreme problems were they to occur.

Research Objective Four: ORCM Elements as Stratifying Variables When Testing HBM Factors for Relationship with Dog-Waste Collection Behavior

The elements from the ORCM that were used as stratifying variables were the antecedent conflict factors and conflict potential rooted in uncollected dog waste. Tests were conducted using chi-square tests of association with 2 x 2 contingency tables *and* the use of a stratifying variable, $p < .05$ with effect sizes reported as Phi and through odds

ratio analyses. The stratifying variable (also known as a layering variable in SPSS) was either an antecedent conflict factor or conflict potential. Antecedent conflict factors were dichotomously represented, while conflict potential was represented by three categories: 1) moderate or extreme problem *and* seen frequently 2) moderate or extreme problem *and* seen infrequently 3) not a problem or only a slight problem *and* seen or not seen frequently. The two 'not a problem' categories were collapsed into one because their cell counts were especially low and because in neither case was there indication of potential for conflict. Measures of tolerance were those previously used when testing for relationship between antecedent conflict factors and HBM factors. Thus, tolerance was reflected by dichotomized responses based on perceptions of the human-dog interaction as more or less of a problem.

Table 39 summarizes the outcomes of the layered chi-square tests of association, $p < .05$. The relationship between HBM factor (threat, benefit, barrier) and dog waste collection, while considering level of the ORCM element will now be respectively described in turn.

Table 39

Summary of Tests of Association between HBM Factors and Dog-Waste Collection When ORCM Element is Included as Stratifying Variable

ORCM Stratifying variable	HBM Threat	HBM Benefit	HBM Barrier
Visit reason	Cannot reject null	Reject null for one level	Reject null both levels & total
Attachment	Cannot reject null	Cannot reject null	Reject null both levels & total
Visit frequency	Cannot reject null	Reject null for one level	Reject null for one level & total
Tolerance for direct human-dog interactions	Cannot reject null	Cannot reject null	Reject null for one level & total
Tolerance for indirect human-dog interactions	Cannot reject null	Cannot reject null	Reject null for one level & total
Tolerance for dog-waste related human-dog interactions	Cannot reject null	Cannot reject null	Reject null for one level & total
Conflict potential	Cannot reject null	Cannot reject null	Reject null for one of three levels & total

Note. If null not rejected, then HBM factor does not relate to dog-waste collection nor does the result vary as level of ORCM element varies. 'Total' refers to an overall test of association when the stratifying variable is collapsed. Yellow cells indicate no relationship and no variation; rose colored cells indicate one level of the ORCM element was associated with a significant relationship between HBM factor and dog-waste collection; blue cells indicate a significant relationship between HBM factor and dog-waste collection overall *and* variation in that relationship depending on level of the ORCM element; green cells indicate that overall *and* at each level of the ORCM element, the HBM factor and dog-waste collection were related.

Threat (failing to be courteous) and waste collection. No relationship was observed between the representative indicator for threat (failing to be courteous to others)

and dog-waste collection, regardless of ORCM element or level of ORCM element. In all seven tests, the null hypothesis was not rejected.

Benefit (not stepping in dog waste) and waste collection. Level of visit reason and level of visit frequency were associated with variation in the relationship between the representative indicator for benefit (not stepping in dog waste) and dog-waste collection, x^2 (1) = 4.087, p =.043 and x^2 (1) = 7.018, p = .008, respectively. Effect size was small (Phi = .160) for visit reason, such that HBM benefit and dog-waste collection were related only when the representative indicator for most important visit reason was present. In this partial association, among visitors who reported their most important reason for visiting the trail was to walk the dog, the odds of being a consistent collector of dog waste were 1.96 times greater for those who perceived the benefit to be something other than the representative indicator of not stepping in dog waste. Effect size was moderate (Phi = .30) for visit frequency, such that HBM benefit and dog-waste collection were related when visit frequency was infrequent. In this partial association, among visitors who reported visiting trails with a dog infrequently, twice per month or less, the odds of consistently collecting dog waste were 4.22 times higher for those who perceived the benefit to be something other than the representative indicator of not stepping in dog waste. In neither case were benefit and collection related when the stratifying variable was collapsed. No relationship was observed between benefit and the other antecedent conflict factors or conflict potential.

Barrier (no bag handy) and waste collection. The relationship between the representative indicator of barrier (no bag handy) and dog-waste collection was significant at all levels of two of the stratifying variables: *visit reason* (level 1: x^2 (1) =

4.412, p = .036, Phi = .212; level 2: x^2 (1) = 5.277, p = .022, Phi = .184; and overall: x^2 (1) = 9.787, p = .022, Phi = .196) and *attachment* (level 1: x^2 (1) = 4.114, p = .043, Phi = .237; level 2: x^2 (1) = 5.804, p = .016, Phi = .179; and overall: x^2 (1) = 9.592, p = .002, Phi = .194). In all instances, effect size was small.

For the remaining stratifying variables (visit frequency, tolerance direct, indirect and dog-waste related, and conflict potential) when levels were collapsed, HBM barrier was related to dog-waste collection overall. In each case as follows, one level of the stratifying variable was associated with a significant relationship between HBM barrier and dog-waste collection: among *frequent visitors* (x^2 (1) = 7.869, p = .006, and Phi = .204), the odds of being a consistent collector of dog waste were 2.33 times higher for those who perceived the barrier to be 'having no bag handy' than for those who perceived the barrier to be something else; among visitors with *less tolerance for direct* human-dog interactions (x^2 (1) = 7.383, p = .007, and Phi = .269), the odds of being a consistent collector of dog waste were 3.48 times higher for those who perceived the barrier to be having 'no bag handy' than for those who perceived the barrier to be something else; among visitors with *more tolerance for indirect* human-dog interactions (x^2 (1) = 8.271, p = .004, and Phi = .196), the odds of being a consistent waste collector were 2.29 times higher for those who perceived the barrier to be having 'no bag handy' than for those who perceived the barrier to be something else; among visitors with *more tolerance for dog-waste related* human-dog interactions (x^2 (1) = 4.087, p = .043, and Phi = .232), the odds of being a consistent waste collector were 2.79 times higher for those who perceived the barrier to be having 'no bag handy' than for those who perceived the barrier to be something else; among participants reporting *greatest potential for conflict* rooted in

uncollected dog waste (triggered sensitivity as moderate or extreme problem perception plus seen frequently in past) (x^2 (2) = 6.407, p = .011, and Phi = .260), the odds of being a consistent waste collector were 3.9 times higher for those who perceived the barrier to be having ‘no bag handy’ than for those who perceived the barrier to be something else.

Chapter 5: Discussion

Land managers often seek to attain competing goals: protecting natural resources from degradation while also preserving opportunity for visitors to enjoy those very natural resources (Manning, 2011; Watson et al., 2016). Although regulations intended to minimize the negative impacts of visitors to natural settings often exist and include guidelines for visitors with a dog, noncompliant dog walking behaviors persist (Blenderman, et al., 2018; Bowes, et al., 2018). Rules often target leash use and cleaning up dog waste. Increasing these behaviors on local nature trails will reduce the potential for conflict within the social environment as well as the natural environment. In so doing, the goals of land managers as well as those of visitors to natural resources will more easily be attained. This chapter will restate the purpose of the current research, the questions that were posed and the methods employed to answer said questions. The findings will be summarized, then interpreted and positioned within the context of the literature before discussing their implications. Conclusions will be stated, future research needs identified, limitations of the research study described, and consideration will be given to conflict beyond outdoor recreation.

The overarching purpose was to explore integrating elements of the ORCM into the HBM framework for the purpose of developing a persuasive message to increase the collection of dog waste on local nature trails. Toward this end, four research questions were posed: What are the perceptions of the selected ORCM elements for trail visitors who walk with a dog and are they related to self-reported dog-waste collection and leash use practices, and to conflict potential? What are the representative indicators for the core elements of the HBM and are they related to self-reported dog-waste collection? Do

ORCM antecedent conflict factors relate to the representative indicators for the HBM factors? Is there added value when integrating elements of the ORCM into the HBM framework for the task of developing a persuasive message to increase the collection of dog waste when on local trails? Participants were recruited using a purposive sampling method for this cross-sectional, online, survey study.

Summary of Findings

Setting and Circulation of Online Survey

Adult visitors to local nature trails in Northborough and Westborough, Massachusetts, who walk with a dog participated in the online survey which was available during a 10-week period spanning from late-April to mid-June 2019. Almost two-thirds of the 284 participants received the link to the online survey via a Facebook post or an email message; while about a quarter received it via public paper posting or local news outlet; and about one-tenth received it at a trail head. No relationships were observed between dog-waste collection or leash use and how the link was received.

Demographics and Dependent Measures

Participants were rarely a professional dog walker and most likely walked with one dog, though several participants reported walking with more than one dog; participants were more often: female, well-educated, in their 40s or 50s, and more often than not residents of one of the two towns where the nature trails were located.

The majority of participants reported that they cleanup after their dogs when walking on a nature trail. Even more participants reported never leaving bagged waste on the ground uncollected at the end of the trail visit. Only a few participants reported never cleaning up after their dogs, and about 10% rarely or sometimes left bagged waste on the

ground. The most commonly reported amount of time participants had their dogs leashed during their trail visits was for a small portion of the visit. About a quarter of the participants, however, reported using a leash for the full duration of their trail visit. Furthermore, leash use was significantly related to dog-waste collection. Those who reported using a leash for the duration of the trail visit were more likely to report cleaning up after their dogs.

Research Objective One: What are the Perceptions of ORCM Antecedent Conflict Factors and are They Related to Self-Reported Dog-Waste Collection and Leash Use Practices or to Conflict Potential?

Three antecedent conflict factors in the ORCM were measured: activity style (motivation), resource specificity (attachment and visit frequency), and lifestyle tolerance (tolerance for human-dog interactions); conflict potential (as sensitivity plus exposure) was also assessed and tested for relationship with dog-waste collection.

Activity style. 'To walk the dog(s)' was ranked among five options as the most important reason for visits to a nature trail with a dog; 'to get exercise or be physically active' was most often ranked as the second most important reason. Visit motivation, measured as such, was significantly related to both dog-waste collection and with leash use during a trail visit. Those participants who reported their most important visit reason to be something other than to walk the dog were more likely to clean up after their dogs; those motivated by a goal of walking their dogs, were half as likely to report always cleaning up after their dog than those motivated by other reasons. Similarly, if motivated by the goal of walking the dog, trail visitors with a dog were less likely to use a leash for

the full duration of the trail visit. The strength of these statistically significant relationships was weak in both cases.

Resource specificity. Most participants reflected attachment to the trails they visited. Each of the four attachment items were agreed with or strongly agreed with by at least nearly two-thirds of all participants. When considered collectively through the creation of an attachment index, over half of respondents had agreed with or strongly agreed with all four of the four attachment items. Attachment measured as such, did not relate with either dog-waste collection practices or leash use during a trail visit. Under the umbrella of resource specificity, the frequency with which trails were visited with a dog was also used as a measure of relationship with the local nature trails. Almost three-quarters of participants visited trails with a dog at least once per week; nearly a third visited a trail with a dog daily. Visit frequency was significantly related to attachment, to dog-waste collection, and to leash use. Those who visited frequently (at least once/week) were more likely to be attached, less likely to consistently collect dog-waste and were less likely to use a leash for the full visit duration. The magnitude of each of these statistically significant relationships was weak.

Lifestyle tolerance. Perceptions of 12 different human-dog interactions as problems were used as a measure of tolerance for such interactions. For this purpose, categories reflected those used when categorizing types of conflict in outdoor recreation, that is, any level of problem perception (slight, moderate or extreme) was considered a problem. Tolerance for human-dog interactions was greater for those interactions that did not involve direct contact between human and dog (e.g., hearing a visitor calling for their dog or seeing wildlife flee when dog present) than it was for dog-waste related

interactions (e.g., seeing uncollected dog waste, bagged or otherwise) or those interactions in which human and dog came into direct contact (e.g., dog sniffing a visitor or dog approaching uninvited). Three distinct tolerance indices (direct, dog-waste related, and indirect) were created in order to collectively represent participants perceptions by type of dog interaction. Almost all (93%) participants perceived both *dog-waste related* interactions as being a problem (whether slight, moderate or extreme); in contrast, only 58% perceived at least four of the five *direct* interactions as being a problem (whether slight, moderate or extreme); and in further contrast only 28% perceived at least four of five *indirect* interactions as being a problem (whether slight, moderate of extreme).

Tolerance was significantly related to leash use in that the odds were higher that a leash would be used for the full duration of a trail visit for those who perceived *indirect* human-dog interactions as being problems, that is, for those who had a lower tolerance for indirect human-dog interactions. The strength of this statistically significant relationship was moderate.

While these data describe the levels at which interactions with dogs are perceived to be a problem, if they were to occur, without a corresponding measure of how frequently they are observed or a measure of their impact on the overall visit experience (be it interference with visitor goals or land management goals), one cannot know whether these levels warrant action on the part of land managers.

Conflict potential. When considering tolerance as a measure of sensitivity rather than for conflict typing, tolerance measures were recoded accounting for level of problem perception and then combined with measures of observation history to assess conflict potential for each of 12 human-dog interactions. Similarly, for this purpose the

observation history accounted for frequency level. Potential for conflict rooted in interactions between dog presence and trail visitors varied depending on whether the interactions involved dog waste, involved direct contact between the two, or the contact was indirect. Not collecting dog waste and leaving bagged dog waste on the ground were the interactions that reflected the most potential for conflict (as perceived by 39% and 40% of participants, respectively), seemingly at levels that would suggest land managers to intervene. Among the five direct interactions, dogs approaching uninvited had the most potential (as perceived by 19%) but in less than half the percentage of participants who perceived dog-waste related behavior as having conflict potential. Among the indirect interactions, the most potential for causing conflict was shared by two interactions: dogs 'play' chasing and dogs being off trail. Approximately the same percentage of participants (about 11%) perceived them as having conflict potential.

The behavior of collecting (or not collecting) dog waste was relevant in each of the four research objectives of the current study. So, conflict potential rooted in the human-dog interaction of owners not collecting dog waste was selected for testing for relationship with antecedent conflict factors and with self-reported dog-waste collection.

***Antecedent conflict factors and conflict potential*.** Other than activity style (which was measured as motivation through assessing most important visit reason), the antecedent conflict factors (resource specificity as place attachment and visit frequency, and lifestyle tolerance as tolerance for human-dog interactions) were significantly though minimally related to conflict potential. Of participants who reported the highest levels of conflict potential (triggered sensitivity) rooted in uncollected dog waste, a greater number than expected were less attached, infrequently visited, were less tolerant of both *direct*

and *indirect* human-dog interactions. Of participants who reported conflict potential as non-triggered sensitivity (uncollected dog waste was perceived as a moderate or extreme problem and seen only sometimes or not at all) a greater than expected number reported a higher attachment level and more tolerance for *indirect* human-dog interactions. Among those with the least perceived conflict potential, a number greater than expected visited frequently and reported more tolerance for *direct* human-dog interactions.

Dog-waste collection and conflict potential. Not surprisingly conflict potential related significantly to dog-waste collection, with a moderate strength. Among those perceiving greater conflict potential (the behavior if encountered would be a problem and the behavior has been frequently encountered in the past) the odds were greater that they would collect dog waste consistently. Among those who perceived the least conflict potential (the behavior if encountered would be minimally problematic if at all and may have been seen frequently or not at all) the odds were greater that they would *not* frequently collect dog waste. A third group, those who perceived dog waste on the ground as a problem but did not see it frequently, showed no difference from chance expectations in terms of their dog-waste collection practices.

Research Objective Two: What are the Representative Indicators for the Core Elements of the HBM and are They Related to Self-Reported Dog-Waste Collection?

Perceptions of the core elements of the HBM indicated that failing to be courteous to others was the representative threat associated with not cleaning up after one's dog, while people not stepping in dog waste was the representative benefit and the representative barrier to cleaning-up after one's dog was not having a bag handy. The

representative reminders were someone responsible for trail upkeep as the one to effectively deliver a reminder message and waste bins for dog waste conveniently located at the trail as a physical reminder. Only barrier was significantly related to dog-waste collection in that the likelihood of cleaning up after a dog was higher for those who perceived not having a bag handy as a barrier to dog-waste collection, than it was for those who perceived something else as the barrier to waste collection. The strength of this statistically significant relationship was however weak.

Research Objective Three: Do ORCM Antecedent Conflict Factors Relate to the Representative Indicators for the HBM Factors?

Only one of the ORCM antecedent conflict factors was significantly related to only two of the representative indicators for the HBM factors in the context of dog waste collection. The antecedent conflict factor lifestyle tolerance, as measured by tolerance for dog-waste related, human-dog interactions was significantly related to HBM benefit and barrier. The tolerance indices used in these tests were those that had been re-coded in order to account for intensity of problem perception. For those with *greater* tolerance for dog-waste related, human-dog interactions (i.e., they perceived them to be less problematic), the odds of perceiving *benefit* as the representative indicator of people won't step in it [dog waste] were slightly higher than the odds for those with less tolerance; and for those with greater tolerance, the odds of perceiving *barrier* as the representative indicator of I have no bag handy were slightly less than what the odds were for those who had less tolerance for dog-waste related interactions. The strength of the statistically significant relationships was weak.

Research Objective Four: Is There Added Value When Integrating Elements of the ORCM into the HBM Framework for the Task of Developing a Persuasive Message to Increase the Collection of Dog Waste When on Local Nature Trails?

Antecedent conflict factors and conflict potential were positioned as stratifying variables when exploring the relationships between dog-waste collection and the representative indicators for the HBM factors of threat, benefit and barrier. Threat (failing to be courteous to others) and dog-waste collection did not relate to each other regardless of ORCM element or level of that element.

In contrast, the relationship between benefit (not stepping in dog waste) and dog-waste collection depended on visit reason and depended on how frequently trails were visited. When the most important visit reason was 'to walk the dog' the likelihood was greater that dog-waste was collected when the benefit of collecting dog waste was perceived to be something other than not stepping in it; this statistically significant relationship was weak. Benefit and dog-waste collection were significantly related when trails were visited infrequently (two times a month of less); among infrequent trail visitors, dog-waste was more likely to be collected when benefit was perceived to be something other than the representative indicator of not stepping in it. The relationship was moderately strong. When either of the two statistically significant stratifying variables was collapsed, no statistically significant relationship was observed between benefit and dog waste collection.

The relationship between barrier (having no bag handy to use to pick up dog waste) and collecting dog waste was statistically significant and depended on level of the ORCM stratifying variable in five of the seven ORCM elements that were tested. In all

cases the pattern of the significant relationship between barrier and dog waste collection at one level of the stratifying variable was the same: the odds of consistently collecting dog waste were higher when the barrier to do so had been perceived as having no bag handy. This was true at one level of the following ORCM factors when used as a stratifying variable: when visit frequency was frequent; when tolerance for direct human-dog interactions was lower; when tolerance for indirect human-dog interactions was higher; when tolerance for dog-waste related, human-dog interactions was higher; and when conflict potential rooted in not collecting dog waste was high. In all cases the strength of these statistically significant relationships was weak.

The remaining two ORCM elements (visit reason and attachment) that were tested as stratifying variables offered no additional insight into the significant relationship between barrier and dog-waste collection. In both cases, the relationship between barrier and dog-waste collection was significant at all levels of the stratifying variable, including when it was collapsed. Partial associations reflected the same pattern of relationship: for those who perceive the barrier to be having no bag handy they are less likely to inconsistently collect dog waste than are those who perceive the barrier to be something else – regardless of level of visit reason or level of attachment. The strength of these statistically significant relationships was weak in all cases.

Interpretation of Findings and Implications

Demographics

As in other studies, more females (71%) participated than males herein; Typhina and Yan (2014) reported participants to be 65% female, Lowe et al (2014) reported 84% and Vaske and Donnelly (2007) reported 56% female. Participants herein appear to be a

little older (average age about 49 years) than those in other studies. For example, participants averaged 42 years in Vaske et al, while Typhina and Yan reported 27% of their participants being 56 years old or older whereas herein at least 31% of participants were 56 years or older. Participants herein and in Vaske et al were well educated. In the latter, one-third of participants held college bachelor's degrees while 53% had some graduate education or had earned advanced degrees. In the former, 37% had earned undergraduate degrees and an additional 40% had some graduate education or advanced degrees. Typhina and Yan did not report educational attainment of their participants, though they did report that about half of their respondents were affiliated with the local university as student, faculty or staff.

Dog-waste Collection and Leash Use

Rates of self-reported dog-waste collection herein were comparable to those reported by others which range from about 60 to 90% (Florida & Southeast, 2009; Lowe et al., 2014; Swann, 1999; Typhina & Yan, 2014; Westgarth et al., 2008). Of note, Typhina and Yan (2014) reported self-reported collection rates of 95% when on a trail. In their study, the question was asked in binary form with a yes or no response to whether one 'almost always' collected dog waste. Herein, a Likert-type question was used. Only two-thirds 'always' collected; when combined with those who responded with 'often', collectors increased to 85% of participants, suggesting that participants herein and those in the Typhina and Yan study were comparable in this regard.

While self-reported measures are often used in the research setting, researchers recognize that a discrepancy, biased to the more socially acceptable action (e.g., Bowling, 2005), may exist between what participants say they do and what they really do

(Westgarth et al., 2010). For current purposes, then, a self-reported collection rate of either 66% (always collects) or 85% (often or always collects) must be tempered by the acknowledgement that it is likely that more dog waste goes uncollected than what participants report. Therefore, dog waste collection remains a justifiable object of study – whether positioned as a conflict prevention behavior (as herein) or as a pro-environment behavior (as in Typhina & Yan).

Although municipal regulations require collecting and properly disposing of dog waste, herein, just over half of those who chose 'other' as the barrier to collecting dog waste indicated that they do not pick up because they let their dogs go off the trail, into tall grass or wooded areas and many see no need to pick up. Although having no bag handy was the representative barrier to collecting dog waste, it is worth considering the different approaches taken by visitors with dogs when visiting a local nature trail. Here, 18% (n = 47) indicated through their open-ended 'other' response that they do not collect their dog's waste because they allow their dogs to leave the trail. Such circumstances (those in which visitors who let their dogs roam freely *and* say that because their dog defecates off trail they do not pick up), raise the question of whether they have similar visit goals as do those who leash their dogs more often. It is not unusual for some dog owners to feel obliged to provide their dogs with exercise opportunities (Cutt, et al., 2008; Westgarth, et al., 2014); perhaps they are more inclined to disregard leash-use guidelines.

A relationship was indeed observed herein between visit reason and leash use; those whose top visit reason was to walk their dog were less likely to leash their dog for the full duration of the trail visit. A deeper dive into the data would be necessary to tease

out whether the visit reasons of those who let their dogs roam off trail – and do not collect dog waste because of that – are the same as the visit reasons given by those who leash their dogs and collect dog waste. The point now, however, is that the target audience (trail visitors who walk with a dog and do not always collect their dog's waste) may be more nuanced than when first considered.

Finally, the relationship between leash use and dog-waste collection observed herein is consistent with the findings of others (e.g., Blenderman, et al., 2018; Wells, 2006; Westgarth, et al., 2010). Although only a quarter of participants herein reported leashing their dog for the full duration of their visit to a nature trail, the frequency of dog-waste collection is greater for this group than for those who do not leash as such.

Implication. While it is tempting to frame uncollected dog-waste and dogs off-leash simply as behaviors that do not comply with rules (when such are in place), it may be more useful to understand the motivations of trail visitors with dogs and their relationships with the trails they visit in order to optimize performance of the desired behaviors while also providing for positive experiences for trail visitors and their dogs. Relevant interests and concerns of all parties to conflict (or potential conflict) can then be considered in behavior change initiatives. Also worth considering, and as others have suggested (Typhina & Yan, 2014), the goal for increasing dog-waste collection might be more readily reached by targeting those who already pick up, to one degree or another, rather than those who do not pick up at all.

Research Objective One: What are the Perceptions of ORCM Antecedent Conflict Factors and are They Related to Self-Reported Dog-Waste Collection and Leash Use Practices or to Conflict Potential?

Each pairing between variables will be described separately.

Activity style. The intent herein was to learn what the most important reason was for visiting a local nature trail with a dog. That intent veered from the outdoor recreation literature which typically seeks to describe important and multiple reasons for a visit to an outdoor setting (see Manning, 2011). The five options provided to participants, however, were selected from established sources (see Manfredo et al., 1996; and see Arnberger & Eder, 2012, for the dog specific item). While 'to walk the dog' surfaced as the most important reason (of five options that were ranked in order of relative importance) when visiting a trail with a dog, to get exercise or be physically active was most often the second most important. Being in nature as an important reason to visit ranked only third among the five; seeking tranquility and doing something with family and friends were rated fourth and fifth in importance as a visit reason, respectively. Regardless of the unconventional approach, when 'to walk the dog' was perceived as the most important visit reason, reports of always collecting dog waste were fewer. Acknowledging the forced-choice nature of ranking options, leads to asking how someone chose rank when level of importance was the same for more than one response.

Implication. Future research may want to utilize an instrument that measures the importance of individual visit reasons looking to evaluate whether results would be similar to those obtained herein. Trail visitors with a dog are generally there to provide their dog with exercise opportunity while also looking to be active themselves. Local

land managers and the public may want to reconsider the management of their trails in protected open space, if visitors with dogs exceed visitors without. Though not measured herein, one local regional land trust recently touted that dog walkers are their largest group of visitors (SVT, 2019 newsletter). In the absence of dog parks, are these local nature trails self-made substitutions?

Resource specificity. The proportion of participants who reported visiting nature trails with a dog at least once per week is comparable to that reported by others. Vaske & Donnelly (2007) reported about two-thirds of their participants having visited at least once per week during the month preceding their participation; across the preceding 12-month period, the average monthly visit frequency exceeded once per week. Herein, 70% of participants reported typically visiting a trail with a dog at least once a week.

Given that 30% of participants in the current study reported visiting local nature trails with a dog on a daily basis and another 40% reported visiting once a week or every two to three days, it is not surprising that over half of participants indicated being emotionally attached (as measured through place identity) to the trails. This finding of a significant relationship between visit frequency and attachment (place identity) is consistent with the findings of others (Backlund & Williams, 2004; Budruk et al., 2008).

The result that is a bit surprising, from the ORCM theoretical perch, is the finding that resource specificity measured as place attachment using place identity was unrelated to dog-waste collection or to leash use. Place identity is intended to reflect the degree to which a place holds special meaning for one's inner life – emotions, social connectedness, purpose (D.R. Williams & Vaske, 2003). Many participants were attached to the local trails they visited but there was no relationship between being

attached or not and whether the participant picked up after their dog or whether they leashed their dog throughout their trail visit. Such a finding however is consistent with the mixed results found in the place attachment literature that explores its relationship with other variables (e.g., Eder & Arnberger, 2012; Price et al., 2018).

Some support for ORCM theory was seen however when resource specificity was measured as visit frequency. In the case of both dog-waste collection and of leash use, participants who visited frequently were less likely to report always picking up after their dogs or leashing their dog for the full trail visit, than those participants who visited infrequently.

Implication. The lack of relationship between attachment and dog management practices though intuitively surprising (it is reasonable to naturally think that one who especially values a setting would behave in that setting in ways that would preserve the setting) might be the logical consequence of being able to take one's dog for a walk on a nearby local trail simply because it is there regardless of attachment level. Most participants lived in one of the two towns where the reference trails are located, but the specific issue of proximity was not herein explored, rendering it a topic for future research.

Land managers however will currently benefit from considering how frequently their trail visitors with dogs walk the trails. Frequent visitors appear to approach the activity of walking with a dog differently from those who visit as infrequently as a few times a year to no more than a couple times a month. Frequent visitors are less likely to leash and less likely to pick up. In the context of communities without an official public dog park, trail visitors who allow their dogs off leash may be doing so as a substitute for

a dog park experience and when visitors allow dogs to wander through deep grasses and woods it is understandable that they would not always pick up their dog's waste. Once land management defines acceptable levels of non-compliance, given that perfection is hardly ever the goal, they will benefit from thinking about their visitors who walk with dogs as being comprised of subsets of groups rather than as a single group.

Lifestyle tolerance. Consistent with Vaske and Donnelly (2007), all 12 human-dog interactions were considered at least a slight problem by some of the participants. In both studies, 'owners not collecting dog waste' was the interaction with the greatest number of participants perceiving it as an *extreme* problem (57% in each study), and 'dogs jumping on a visitor' was the interaction with the second highest frequency of being perceived as an *extreme* problem (35% in each study), though Vaske and Donnelly additionally observed that 'dogs pawing a visitor' was also reported by 35% of participants as an *extreme* problem. Herein the third highest was 'dogs pawing a visitor' at 21% whereas in Vaske and Donnelly the third highest was tied between 'dogs pawing a visitor' and 'dogs flushing birds' at 24%.

In terms of the human-dog interactions deemed to be not a problem at all, the interaction with the greatest number of participants perceiving it as such was the same between the findings herein and those of Vaske and Donnelly (2007): 'dogs play chasing another dog' at 63% in the former and 56% in the latter. Herein 'dogs flushing birds' and 'dogs sniffing a visitor' were the interactions with the second and third highest frequencies of being perceived as not a problem at all, 59% and 58% respectively. Whereas in Vaske and Donnelly, 'dogs off trail' was perceived by 53% of participants as not at all a problem; and 'dogs sniffing a visitor' ranked 3rd in this regard, at 48%.

While participant problem perceptions were often similar if not the same between the two studies, stark contrast was seen regarding perceptions of 'dogs flushing birds' in that twice as many participants herein (59%) perceived it to be not a problem at all compared to 26% in Vaske and Donnelly (2007); additionally, while 35% of participants in Vaske and Donnelly perceived 'dogs causing wildlife to flee' as an extreme problem, only 15% herein did so;. Such discrepancies raise the question of whether the participants in the two studies differ in terms of their attitudes toward the inhabitants of natural settings.

It was helpful herein to create three indices by type of human-dog interaction to summarize problem perceptions of direct, indirect, or dog-waste related interactions. In so doing, it was not only easier to see that tolerance for indirect interactions was greater than tolerance levels for direct interactions (those in which dog approaches or touches a visitor), but tests of association between dog management practices and the respective tolerance indices indicated an absence of relationship between the indices and dog-waste collection; and only the index of tolerance for *indirect* human-dog interactions was significantly associated with leash use.

When tolerance was lower, the odds were higher that a leash would be used for the full duration of a trail visit compared to the odds of those who perceived fewer of the interactions to be problematic. Apparently participants who were sensitive about dogs being off trail, wildlife fleeing, dogs play chasing other dogs, birds flushing, and the sound of owners calling for their dogs were more likely to leash their dog for the entire visit than those who were less sensitive about these interactions. For dogs to engage in

such indirect interactions with humans, it is likely they would be off leash; so, it makes sense that someone who is bothered by these interactions would leash their own dog.

Implication. Levels of sensitivity to human-dog interactions varied by type of interaction (direct, indirect, or dog-waste related) suggesting a need for focused interventions to shape behaviors that do not trigger that sensitivity. While sensitivity to human-dog interactions across studies was comparable in several ways, the differences provide a cautionary note to land management to be mindful of local attitudes toward the natural resources over which they preside.

Conflict potential. Although sensitivity toward uncollected dog waste was high (84% of participants would be bothered moderately or extremely by encountering it), potential for conflict was tempered by simultaneously considering how often an encounter with uncollected dog waste occurred during past trail visits. When combined into a single measure (problem perception plus past exposure), only about 40% of participants reported conflict potential as triggered sensitivity; they think dog waste on the ground is a problem and they frequently encounter it. So, while more than twice that percentage are bothered by uncollected dog waste, only about half experienced encounters with the conflict source.

Conflict potential rooted in dog waste left on the ground indeed was related to self-reported dog-waste collection practices. Those who perceived little conflict potential (no to little potential) were more likely to report collecting dog waste *less than* always, while those who perceived greatest conflict potential (triggered sensitivity) were more likely to report *always collecting* dog waste. These participants perceived dog waste on the ground to be a problem and they often encountered it. Interestingly, those who

similarly perceived dog waste as a problem but did not frequently encounter it, were no more or less likely to collect dog waste than would be expected.

These findings are intuitively not surprising; what is surprising, is that the antecedent conflict factor tolerance for dog-waste related, human-dog interactions (measured through an index comprised of two items) did not relate with picking up after one's dog. The discrepancy might be due to the inclusion of a measure of past exposure in the conflict potential measure; and in turn, it was the likelihood of encountering uncollected dog waste that triggered the sensitivity such that a relationship with dog-waste collection behavior was observed; or the discrepancy may be the result of the second item in the index score (which inquired about the frequency with which the participant left bagged waste on the ground, unretrieved). This second item was not incorporated into an index measure of conflict potential (as a practical matter) and thus was not represented in the test of association between conflict potential and collecting dog waste in the way that it had been included in the test of association between tolerance and dog-waste collection.

Finally, antecedent conflict factors and conflict potential rooted in uncollected dog waste were related except for activity style (as most important visit reason). Of most importance perhaps was distinguishing between those who perceived uncollected waste to be a problem and whether they frequently encountered it during past visits. Their patterns of responses were different, suggesting that sensitivity alone would be a poor predictor of conflict potential.

Implication. Theoretically, the ORCM antecedent conflict factors should relate with conflict potential since it is theorized that the antecedent conflict factors are related

to conflict sensitivity (see Manning, 2011 and see Figure 1 on page 4) and herein conflict sensitivity (i.e., perceived problem level) was used as one of the components of conflict potential (i.e., perceived problem plus exposure history). Among trail visitors who walk with a dog, there are different perceptions of the conflict potential rooted in dog waste left on the ground and those perceptions are associated with dog-waste collection practices. This finding supports the argument of emphasizing the role of potential for conflict within the theoretical underpinnings of the ORCM. Along with that, is the argument, based on the findings herein, to incorporate 'likelihood of experiencing the conflict source' into a conflict potential measure. Further research into whether conflict potential relates with the experience of conflict would not only address a gap in the literature, but also provide land managers with information for targeted approaches to conflict prevention. Conflict potential measures could also be used to determine whether potential levels warrant any action by trail management. It remains to be seen in future research whether similarly assessing conflict potential rooted in the other human-dog interactions proves useful from a conflict prevention/management perspective.

Research Objective Two: What are the Representative Indicators for the Core Elements of the HBM and are They Related to Self-Reported Dog-Waste Collection?

Evaluating the HBM, as Typhina & Yan (2014) had, for the purpose of developing a communication campaign to increase the collection of dog waste drove many of the design decisions in the current research. The representative indicators for threat (failing to be courteous to others) and benefit (not stepping in dog waste) matched those that emerged in Typhina and Yan. A single barrier (having no bag hand) however

emerged herein as the representative indicator, whereas Typhina and Yan combined separate responses of having no bag handy or of no waste bins nearby to form a significantly meaningful representative indicator for barrier (See Typhina, 2011). In each study, the representative indicator for an effective messenger was someone in a position of authority while the representative indicator for a physical reminder was measured differently and does not allow direct comparison. Herein, response options were tailored to a single setting that of local nature trail. Typhina and Yan however offered response options that applied to street and/or trail settings and they omitted offering the option of waste bins.

As did Typhina and Yan (2014) the current research demonstrated how to use the HBM framework to describe the representative threats, benefits and barriers to collecting dog waste. Other than for the HBM factor of barrier, the current research did not demonstrate meaningful relationships between HBM factors and dog waste collection. However, this finding of barrier being associated with the dependent measure is consistent with the findings of studies often seen in health promotion/prevention studies (see Abraham & Sheeran, 2005, 2007; Champion & Skinner, 2008) as well as in studies that applied the HBM to environmental concerns (e.g., Lindsay & Strathman, 1997; Morowatisharifabad et al., 2012; Straub & Leahy, 2014; Yoon & Kim, 2016).

Typhina and Yan's results indicated that setting mattered because their results varied depending on whether dog waste collection in a street setting or in a trail setting was being considered. For a trail setting, they reported significant relationships between dog waste collection and benefit (not stepping in it) and reminders (signs, portable bag dispensers); whereas herein only barrier (having no bag handy) related to dog waste

collection. Strength of relationships between variables in Typhina and Yan were all weak, as was the case between barrier and dog waste collection in the current study.

Implication. It appears that threat may not have been adequately measured for the trail setting. In neither study did it associate with dog waste collection. Phrasing for threat and benefit items may not have been understood as measuring threat versus measuring a benefit, although the phrasing reflected best practice (see Champion, 1984; Typhina & Yan, 2014) Future research will benefit from assembling a list of possible threats tailored to trail walkers. It is not unusual for trail visitors to walk and see few other visitors, if any; so not being seen may impact both susceptibility and the level of severity of threat in a trail setting. Additionally, threat herein was not a combination of separate measures of severity and susceptibility, a common criticism applied to HBM research (e.g., Champion & Skinner, 2008). It may simply be that the severity and/or the susceptibility of the consequences of not collecting dog waste on a nature trail are insufficient to be perceived as a threat to be avoided. Alternatively, threat may have been mis-measured and so too its components. In consideration with the findings of Typhina & Yan any additional application of the HBM to the prescriptive behavior of dog waste collection will benefit from investing in the development of a validity- and reliability-tested instrument, which would be a reflect best practice and address criticisms of how the HBM is applied (Champion, 1984; Abraham & Sheeran, 2005)

Taken together, the current study and Typhina & Yan do not provide the theoretically necessary relationships between HBM factors and prescribed behavior to immediately develop an evidenced-based persuasive message. At most there are hints to relationships, but these are typically weak. Anyone drawn to applying the HBM to the act

of dog waste collection, should first invest in developing a tool that aligns with measuring the construct of threat as being comprised of both severity and susceptibility – both measured separately. Of course, while such an endeavor is theoretically reasonable, it would require a commitment of considerable resources.

Research Objective Three: Do ORCM Antecedent Conflict Factors Relate to the Representative Indicators for the HBM Factors?

Tests of association between antecedent conflict factors and representative indicators for HBM factors were conducted in prelude to integrating the ORCM into the HBM framework. For the most part, the ORCM antecedent conflict factors and the representative indicators for the HBM factors did not relate to each other. The findings offer little substantiation for considering the antecedent conflict factors among the HBM modifying variables that associate with a decision to act (or not) that weighs benefits and costs to acting, against avoiding the feared consequence.

Furthermore, in the absence of relationships or strong relationships between each of the three core HBM factors and the recommended behavior of collecting dog waste, it is difficult to tease out whether it is the theories that are not complimentary or whether the lack of relationship between representative indicators of HBM factors and the prescriptive behavior 'collect dog waste' is indicative of the ineffectiveness of using the HBM as applied here (and in Typhina & Yan, 2014) to inform a persuasive dog waste collection message.

Only in the instance of the antecedent conflict factor of tolerance for dog-waste related, human-dog interactions was a significant relationship seen. In contrast to the other antecedent conflict factors, it is not surprising that a measure used herein that

reflects sensitivity toward uncollected dog waste would relate with variables that specifically related to dog waste: obstacles to collecting dog waste and benefits of collecting dog waste. Tolerance for uncollected dog waste related with HBM benefit (people won't step in it) and with HBM barrier (No bag handy).

Regarding benefit, when tolerance was greater, the odds were slightly higher that the representative indicator of not stepping in dog waste would have been perceived compared to when tolerance was lower. It may be that those who have less tolerance for dog-waste related human-dog interactions recognize that there may be other reasons (e.g., eliminating a potential environmental pollutant, contagion, or aesthetic detractor) for collecting dog waste in addition to the seemingly obvious one of not stepping in it.

Regarding barrier, when tolerance for uncollected dog waste was greater, the odds were lower for perceiving the barrier as the representative indicator of having no bag handy compared to the odds of perceiving the same when tolerance was lower. Those with lower tolerance for dog waste left uncollected are more likely to perceive having no bag handy as the primary obstacle to its being picked up than those with greater tolerance for dog waste left on the ground. One way of understanding this phenomenon is to consider that those who are bothered by dog waste on the ground are perhaps more interested in a method for its quick removal (pick it up with a bagged hand) rather than being too busy, or thinking it too 'gross and stinky' to touch, or believing 'it's not a big deal to leave dog poop on the ground', or being deterred by the absence of waste bins.

Implication. Without a statistically significant application of the HBM to the decision-making process involving whether to collect dog waste in a natural setting, the usefulness of identifying modifying variables in the HBM framework can be debated.

However, further research is needed to evaluate whether a different method of assessment of the HBM factors of threat, benefit and barrier to collecting dog waste would result in different findings. Thus, it may be premature to disregard the influence of ORCM antecedent conflict factors on the decision to collect dog waste as framed by the HBM.

Research Objective Four: Is There Added Value When Integrating Elements of the ORCM into the HBM Framework for the Task of Developing a Persuasive Message to Increase the Collection of Dog Waste When on Local Nature Trails?

With an objective of developing a persuasive message rooted in HBM theory, it appears that there is very little added value in stratifying on an ORCM element and then considering the relationships between HBM factors and dog-waste collection. While threat continued to not relate with dog-waste collection regardless of which ORCM stratifying variable was applied, the relationship between benefit and dog-waste collection did depend on level of two of the ORCM elements. When considered alone, benefit and dog-waste collection were not shown to be related herein. However, they did relate significantly, among those who had reported their most important visit reason to be to walk the dog. Among these trail visitors, however, those who did not perceive the benefit of collecting dog waste to be the representative indicator (not stepping in it) were the ones with greater odds of reporting always collecting dog waste. Similarly, when stratified on visit frequency, for infrequent visitors, the odds of reporting always collecting dog waste were higher for those who did not perceive the benefit of picking up as the representative indicator for benefit. None the less, in neither case, do the findings suggest that HBM theory be used to explain the role of benefit in an expectancy value discrepancy model predicting dog waste collection.

The only HBM factor for which representative indicator own its own related significantly with dog waste collection was barrier – not having a bag handy. In that test of association, a weak relationship was observed such that those who perceived the barrier as the representative indicator had higher odds for reporting that they always collect their dog's waste. It is thus not surprising that significant relationships between barrier and dog-waste collection were observed when stratifying variables were use. The pattern of significant relationship was similar but dependent on level of stratifying variable for visit frequency, each of three tolerance indices, and conflict potential. Such a significant relationship was seen among frequent visitors, those with less tolerance for *direct* human-dog interactions, those with greater tolerance for *indirect* human-dog interactions, those with greater tolerance for *dog-waste related*, human-dog interactions. Finally, among those who perceived greatest conflict potential rooted in uncollected dog waste (perceived problem level was moderate or extreme and observation history was often or always) also had higher odds of reporting that they always picked up their dog's waste when perceiving the barrier to picking up to be the representative indicator.

Although barrier and dog-waste collection were significantly related at all levels of visit reason and attachment, neither visit reason nor attachment added much additional information when used as a stratifying variable. The pattern of the significant relationship between HBM factor barrier and dog-waste collection was always the same: for those who perceive the barrier to be having no bag handy they are less likely to inconsistently collect dog waste than are those who perceive the barrier to be something else – regardless of level of visit reason or level of attachment. It seems what might be gleaned by using visit reason and attachment as stratifying variables is that from an ORCM

theoretical perspective they do not appear to be associated with the relationship between dog-waste collection and barrier to collecting dog waste.

Implication. In the absence of respective representative indicators for the HBM factors of threat, benefit and barrier associating with dog-waste collection, the value of considering these relationships after using a stratifying variable is questionable. However, the findings herein indicate the use of a stratifying variable can help to further identify differences that are unlikely to be due to chance. However, that information cannot be used to the benefit of developing a persuasive message rooted in HBM theory. Instead, as is the case herein, it helps to describe subgroups within the sample. Because the sample is homogenous (i.e., must walk with a dog on local nature trails) demonstrating variation within the group using outdoor recreation conflict variables is potentially helpful for any targeted efforts. This 'added value' however veers from the intended objective of using HBM theory to develop a persuasive message and communication strategy.

Conclusions

Research Objective One

Using the ORCM to frame interactions with dogs as potential sources of conflict was shown to be a promising tool. Antecedent conflict factors and conflict potential showed some relationship with dog management practices, that is, relationship with potential sources of conflict. By pairing the ORCM with a general conflict resolution model, the conflict specialist offers the field of outdoor recreation an established process by which to both analyze a conflict and then move toward resolution. Figure 9 depicts such a pairing using the previously described Resources and Values Model for conflict analysis and resolution (Katz et al., 2011).

In Figure 9, the ORCM (as previously depicted in Figure 1, see page 4) has been streamlined through the lens of conflict analysis such that the conflict experience is labeled as goal interference and beneath it conflict type (interpersonal, social values, or a combination of the two) and possible conflict parties (out-group, in-group, management, and other users) are listed. Conflict outcomes are aligned to indicate that each is a possibility. In this way, the depiction stays true to Manning's (2011) expanded conflict model and the theoretical contributions made by Jacob & Schreyer (1980) who described recreation conflict as goal interference due to the behavior of others and Vaske and colleagues (Carothers, et al., 2001; Gibson & Fix, 2014; Vaske, et al., 2007; Vaske, et al., 1995) who asserted the existence of a different type of conflict by recognizing a difference between interests rooted in needs or resources and interests rooted in beliefs and values. The stages of one approach to conflict analysis and resolution (the Resources and Values Model) are paired with the ORCM by setting them off beyond conflict outcomes in Figure 9.

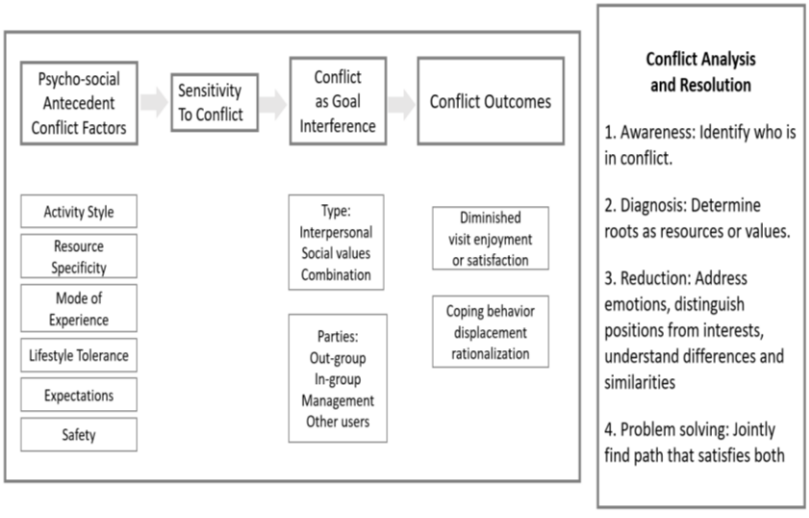


Figure 9. The outdoor recreation conflict process as the focus of one approach to conflict resolution.

Figure 9 above, pairs a four-stage model of conflict resolution (the Resources and Values Model per Katz, Lawyer and Sweedler, 2011), with conflict as described in the ORCM. The ORCM (Manning, 2011) informs analysis of the conflict and is extended through engagement with the conflict resolution stages of reduction and problem-solving.

Stage one of the depicted resolution model requires the acknowledgement that perceptions of conflict or its potential exist, even when only experienced unilaterally (as is often observed in outdoor recreation). That is, there is awareness that a problem exists; and as part of this first step, those in conflict are identified; various conflict dyads are easily acknowledged by the ORCM. For example, is it between the manager and visitors or is it between visitors engaged in the same activity or between those engaged in different activities?

In Stage two, the antecedent conflict factors of the ORCM can help to determine conflict type by pointing to psycho-social variables (such as activity style and lifestyle tolerance) that may affect recreationists' perceptions of conflict sensitivity or of the conflict itself. For example, under the umbrella of activity style, were important visit reasons not realized due to the actions of others? Were differences observed in tolerance levels for the conflict source? From a conflict prevention perspective, focusing on conflict potential, as measured herein, provides for distinguishing between visitors who not only perceive behaviors to be problematic if they were to occur, but also have a history of experiencing the perceived problematic behavior. Differences were observed herein among those who perceived greatest conflict potential (triggered sensitivity: problem + frequent exposure), some conflict potential (non-triggered sensitivity: problem

+ infrequent exposure), or none to minimal conflict potential (behaviors were not sufficiently perceived as problems regardless of whether or not seen). Such information gleaned through the ORCM will help to inform the analysis and diagnosis of the conflict.

It is worth noting at this point, that herein, whether conflict potential was rooted in goal interference, values, or a combination of the two was *not* investigated; though Vaske and colleagues and others (Carothers, et al., 2001; Gibson & Fix, 2014; Vaske et al, 1995; Vaske et al., 2007) may beg to differ. Over the years as they developed a typology for outdoor recreation conflict, it appears to this researcher that they moved into conflict potential without naming it as such. This researcher prefers to distinguish among sensitivity, potential and experienced conflict. Regardless, future research or program assessments by land managers can easily inquire about the type of conflict or conflict potential. With knowledge of different levels of conflict potential (and potentially with knowledge of whether the sensitivity is values based), the door is open to the next stage in the conflict analysis and resolution model.

Having used elements of the ORCM to diagnose the conflict, affixing a resolution model to it as in Figure 9 extends the utility of the ORCM. Rather than ending with any of a variety of conflict outcomes, the resolution model directly leads from analysis to an effort to reduce conflict, making it possible for the parties to engage in collaborative problem solving. The pairing of models also illustrates how knowledge produced in different fields can complement and enhance each other. Effective conflict reduction approaches vary based on whether root cause is needs based, values based, or both. As guided by Katz et al., (2011), regardless of the type of root cause, in Stage three the conflict management strategy begins with identifying heightened emotions and dealing

with those first. For needs and resource-based conflicts, interests and positions should then be differentiated, similarities and differences respectively articulated and understood, before moving into Stage Four problem solving. For values-based conflicts, after dealing with emotions, the conflict management approach should next address naming and understanding similarities and differences before considering problem solving.

Finally, in Stage Four, a problem-solving process for a recreation conflict can be facilitated as informed by ORCM measures, regardless of whether the conflict is needs/resources based, values based or both. Recall that the problem-solving process is intended "…to uncover a course of action that will satisfy the principal interests of all parties to a conflict and completely resolve the conflict situation" (Katz, et al., 2011). The seven steps of the problem-solving process can guide those involved in outdoor recreation conflict to come to resolutions after collaboratively identifying the problem, brainstorming all possible options, evaluating those options, choosing an acceptable option for solution, devising a plan to implement the solution, providing for a way to measure the effectiveness of the solution, and finally to reflect on the process itself and share those reflections with all involved in the problem-solving (see Katz et al., 2011, p. 119).

In outdoor recreation, conflict problems are often managed through zoning or through educational efforts (Manning, 2011) and can be offered as part of a problem-solving process if the parties deem either appropriate. Zoning is intended to provide visitors with opportunities to realize their visit goals by keeping conflicting visitors apart from each other. For example, were some areas officially designated as off leash areas,

then those visitors who prefer leashing their own dog and being around other dogs that are also leashed could walk on trails and areas where the leash requirement is in effect. Zoning is particularly effective with needs/resources (i.e., ORCM's goal interference) types of conflict. Values-based recreational conflict tends to respond better to educational efforts that address codes of conduct or develop local norms or foster rules of etiquette (Manning, 2011; Ivy et al., 1992; Ramthun, 1995).

Overall, the ORCM is poised to frame the conflict process associated with dog-walking practices on local nature trails. From being able to describe antecedent conflict factors that relate to both conflict potential and to conflict sources, the stage is set for land managers to understand their visitors, who sometimes double as parties to conflict. Using conflict potential rooted in uncollected dog waste, the antecedent conflict factors of resource specificity (both attachment and visit frequency) along with lifestyle tolerance, as measured by perceptions of *indirect* human-dog interactions as problems, were shown to be related to conflict potential as would be theoretically expected using the ORCM (Jacob & Schreyer, 1980; Manning, 2011). Evaluating, in similar fashion, the conflict potential of the other human-dog interactions measured herein will help determine whether the application of the ORCM in this way, warrants further study for the purpose of conflict prevention. The ORCM however describes a conflict process which can easily be paired with a generally applicable, and thus relevant to the field of outdoor recreation, conflict analysis and resolution model which can further enhances land managers' conflict management toolkits.

Research Objective Two

While the core constructs of the HBM threat, benefit and barrier along with the reminder cues of messenger and media provided an intuitively attractive framework for describing the benefits of collecting dog waste, the barriers that must be overcome in doing so, the feared consequences that would be avoided by picking up dog waste and the cues to action (reminders) that help to ensure the behavior will be performed, little evidence was observed herein to make for an argument that the HBM should be the theoretical basis for a persuasive message to increase the collection of dog waste on local nature trails. Having said that, however, in the absence of an instrument tested for its validity and reliability, it can be argued that to abandon the application of the HBM for such purpose may be premature.

Research Objective Three

Similarly, a lack of several associations between ORCM antecedent conflict factors and representative indicators for HBM factors offers no immediate justification for pairing the two. Because only tolerance for dog-waste related, human-dog interactions related minimally with the representative indicators for HBM benefit and HBM barrier and such a tolerance measure reflected sensitivity toward uncollected dog-waste, it may be worth considering whether conflict potential (sensitivity plus experience) might relate with the HBM factors. Such would be worth considering in future research that utilizes a valid and reliable measuring instrument for the HBM factors.

Research Objective Four

Given the findings for research objectives two and three, it was somewhat surprising that in some instances, the relationship between the representative indicator for the HBM factor and dog-waste collection depended on which ORCM element was the

stratifying variable and depended on level of ORCM element. For example, HBM factor benefit and dog-waste collection were associated at one level of activity style and one level of visit frequency, but not when the stratifying variable was collapsed. Such was probably an incidental finding, because the pattern of the relationship did not support the goal of using the HBM to inform a persuasive message for dog-waste collection.

Less surprising, because it was the only HBM factor to significantly relate on its own with dog-waste collection, the HBM factor barrier and its significant relationship with dog-waste collection was better understood by using antecedent conflict factors and conflict potential as stratifying variables. From a descriptive vantage, it may be well to pair the ORCM with the HBM. But to pair the two for the purpose of developing a persuasive conflict-preventing message is a stretch, based on the findings throughout herein. Rather, before seeking the development of a persuasive strategy in this context, development of valid and reliable instruments modeled after typical HBM applications is warranted.

Overall Conclusions

Although the theoretical framework of the ORCM was shown to be useful in positioning uncollected dog waste and leash use as potential sources of conflict, the HBM failed to serve as a theoretical tool for developing a conflict prevention, persuasive strategy. It did however identify a relationship between dog-waste collection and the barrier of having ‘no bag handy to collect dog waste’. The ORCM on the other hand assisted in theoretically distinguishing conflict potential from conflict type. Its use further pointed to antecedent conflict factors associated with – though usually weakly – conflict potential and with dog-walking practices. A description of how to comfortably apply a

general conflict analysis and resolution model while incorporating information gleaned from the ORCM was offered.

Future research is needed to determine whether conflict potential is associated with or predicts a conflict experience and in turn whether that conflict potential also associates with impacts of conflict and the reduction or resolution of said conflict experience. If so, then utilizing the ORCM for conflict prevention purposes by distinguishing between levels of conflict potential as triggered sensitivity, non-triggered sensitivity, or minimal to no sensitivity will provide trail management with theoretical justification for tailoring their management strategies to the levels of conflict potential in their particular settings.

Limitations

Methodological limitations include the use of a non-probabilistic sampling method resulting in a sample that is unlikely to be representative of all visitors to local nature trails who walk with a dog and in turn the non-probabilistic sampling method restricts the generalizability of the findings. Such a choice herein reflected in part anticipated challenges of conducting research in the field. Local land managers are typically unaware of how many visitors (and how many unique visitors) frequent their trails, thus the population from which the sample comes is unknown. Utilizing varied methods of recruitment was intended to engage in broadest reach to create as large a sample as possible while purposefully sampling only those trail visitors who walk with a dog.

Whether a comparable sample would be obtained utilizing different recruitment methods (e.g., U.S. postal mailing to all residents with a licensed dog in the towns where

the local trails are located or a more robust social media campaign) remains an open question for future research. As a logistical concern to conducting research, identifying effective methods by which to reach members of the population of interest, provides useful information in and of itself.

Although instruments used herein were informed by the literature and were piloted, whether the theoretical constructs as described in the ORCM and in the HBM were measured accurately cannot be attested to since the instruments were not tested for their validity nor reliability. With the use of such instruments, it will be interesting to see how future findings compare with existing. And certainly, the exploratory findings herein justify future study of the ORCM as a framework in which to position dog-walking practices as potential sources of conflict.

Although statistical significance was observed at levels ranging from $p < .05$ to $p \leq .001$, the size of the effect or the strength of that relationship was usually small/weak. Therefore, consumers of this research (specifically trail managers) should question whether there are practical implications given such modest magnitudes. Alternatively, those interested in further investigating the use of the ORCM, may be able to detect larger effects indicative of stronger relationships by improving the ability of the statistical analysis to detect such effects if they really do exist; for example, a larger sample size may help in this regard. An *a priori* power analysis conducted for tests of association and not just for tests of goodness of fit (as was done herein) can help with future study design.

No assertions of causality can be made because this exploratory research was designed to identify relationships between variables; it was not designed to determine the effect of a variable on another.

Beyond Outdoor Recreation

With an eye toward conflict prevention in shared spaces, the current research was an example of exploring potential conflict in an outdoor recreation setting focused on one group of users. Though of limited scope, the project demonstrated the feasibility of looking beyond one's own field to propose and test ideas. The study freely paired, for exploration or discussion, theory-based models from different disciplines: outdoor recreation, public health and conflict resolution studies. In so doing, the current research demonstrated the merits of multidisciplinary efforts.

While outdoor recreation and land management specialists developed within their field a framework (the ORCM, see Manning, 2011) by which they can describe a conflict situation, by augmenting it with tools from the field of conflict resolution studies (as was discussed herein the Resources and Values Model of Conflict Resolution in Katz et al., 2011), outdoor recreation and land management specialists could more completely characterize the conflict process and seamlessly manage conflict by formally applying a conflict resolution model that necessarily includes analyzing the conflict before moving toward conflict reduction and/or resolution. And were a problem-solving process to produce a collaboratively decided upon solution calling for a persuasive communication campaign, the HBM from public health (see Rosenstock, 1974; Champion, 1984) is a framework that can be tested for both creating the message and identifying how and who to best communicate that message.

Conflict Resolution Studies: A Field with Broad Applicability

The relevance of the current research as an example approach to conflict prevention and management is perhaps more apparent when alternative scenarios are

considered, especially those in which resources are shared. One example considers different perspectives on the social time after a Sunday church service, sometimes known as ‘coffee hour’. Generally coffee hour is a time to enjoy a morning snack and the company of peers in a large room or a hall. Older adults may not want young children to attend because the children may run or use their outdoor voices; alternatively parents and guardians may want the children to be welcomed so that the adults can socialize with their peers; yet other parents may want someone else to monitor their children after the service so that they (the parents) can socialize unencumbered by the youngsters; and still there may be adults (sans children) who want the children to attend so that they (the adults) can interact with the kids with whom they otherwise would not interact; and still other adults, church leaders, may want everyone welcomed as a testament to the inclusiveness of the organization. And who’s to say what the children might want!

The church-owned hall in which coffee hour takes place are finite resources analogous to local nature trails. Church members attend coffee hour for a variety of reasons, as do trail visitors when walking a trail with a dog. Diagnosing the conflict, points to different user groups in conflict. For simplicity, on the trails, trail visitors with dogs and trail visitors without dogs comprise two user groups; within ‘visitors with a dog’ there are those who leash and those who do not. Similarly, amongst coffee hour attendees there are adults with children and adults without children; within ‘adults with children’ there are those who welcome the expansive space in which their children can move as if outdoors: dance, jump, or chase and those parents who require their children behave as they would in any ‘indoor’ setting.

Rather than merely experiencing an atmosphere in which differences have negative impacts (e.g., church members chastising children and their parents, members skipping the social hour completely, or members engaging in nonproductive arguments) perhaps resulting in a diminished sense of community, the situation can be analyzed as conflict with an eye toward resolution, thus preventing future conflict or escalation. Here too application of a conflict resolution model such as the four stage Resources and Values Model (Katz et al., 2011) can guide the church leadership in identifying the parties to the conflict, the underlying roots of the conflict, the emotions involved, and cultivating awareness and understanding of differences and similarities between and among parties to the conflict. Finally, a problem-solving process could guide the selection of options for solution that will satisfy the interests of all involved. And it is worth noting, as was seen with the trail visitors who walk with a dog, the members of one user group may not be as homogenous as one might think. From a conflict prevention stance, knowledge of conflict potential measured as sensitivity to the conflict source (young children running around with little to no supervision) in combination with past exposure to the conflict source (every Sunday morning versus a few Sundays across the year versus never encountering such circumstances) may better assist church leadership in organizing a social event enjoyed by all who attend.

Similarly, in a second example, decisions regarding access to a shared pool of support-staff, by partners in a client-based business lend themselves to situations characterized by conflict. What will be more heavily weighed when deciding which junior, administrative or para-professional staff member will be assigned to a partner's caseload: the partner's seniority in the firm or a looming client deadline or the monetary

value of the client contract or the cultivation of a junior staff member to succeed a partner nearing retirement? A partner may experience conflict with the firm's leadership (those who decide staff allocations), if they feel ill-equipped to service their clients because of insufficient support, resulting in lack of motivation to bring in new clients, poor morale, and diminished work performance. An awareness of conflict potential by the firm's leadership would be reflected in pre-emptively including all partners in the development of such decision trees. However, a partner who perceives 'receiving support' as an obstacle and thus a problem (sensitivity) and repeatedly experiences insufficient levels of support (exposure) will have greater potential (triggered sensitivity) for conflict with the firm's leadership team. Formally applying a conflict analysis and resolution model will expedite returning the firm to a productive and positive workplace in that the interests of the formerly displeased partner and the firm's leadership will have been addressed.

As I write, a global pandemic has gripped our planet. It is easy to see the potential for social conflict as new guidelines for sharing public space are issued from the government and as such, a must to suggest it as a third example of the relevance of the current research beyond outdoor recreation. The Centers for Disease Control (CDC) recently published an attractive poster (visit cdc.gov/coronavirus, May 13, 2020) urging people to 'stop the spread of germs' by engaging in seven different behaviors including the practices of social distancing (staying six feet away from others) and wearing face masks or coverings. And while an overarching goal of inhibiting a public health crisis by stopping the spread of germs is obvious, less obvious in the CDC poster is whether there is awareness of other stakeholder goals, beliefs, and motivations.

Anticipating the social conflict that might occur in association with their requests for behavior changes will assist in more efficiently and constructively achieving those behavior changes. By considering factors that exist before the conflict is realized, the focus shifts to addressing conflict potential proactively. For example, what are the identities (and belief systems and subjective perceptions) of the conflict parties and stakeholders? And for that matter, who are the parties to conflict?

While a conflict dyad including the CDC and the public (analogous to land managers and trail visitors) can be immediately identified, it is only through positioning noncompliance for the CDC's guidance (e.g., not wearing a face covering or not staying six feet way from other people) as a source of potential conflict (akin to noncompliance with regulations that govern dog walking in public spaces), do we easily see the varied conflict dyads that could emerge: managers in essential retail businesses (e.g., pharmacies and grocery stores) and their employees; these employees and other employees; these employees and their customers. Wherever we find shared space, there is opportunity for social conflict between CDC compliers and noncompliers. In the workplace. At the grocery store. On public transit. In houses of worship. On the sidewalks of our neighborhood. Would anyone have predicted that a dad walking with his two children would pull a knife on a jogger wearing no face mask (Ellement, 2020)?

The application of a complete conflict analysis and resolution model (e.g., see Cheldelin, et al., 2008; Carpenter & Kennedy, 1988) would highlight the multiple, subjective perspectives present, sources and dynamics of conflict, and describe the external context of and influences on the conflict. The pandemic example is offered as one of consequence and as one that would benefit from collaborations across specialties,

collaborations that include conflict resolution specialists. Addressing the needs and interests of the many who comprise 'the public' might best be served from a perch that includes anticipating social conflict *while simultaneously offering strategies to analyze and manage that conflict* and in that way the behavior change that public health officials seek may be more quickly and effectively realized.

These conflict examples along with those associated with walking with a dog on local nature trails collectively illustrate how conflict resolution skills can be applied in a variety of contexts (religious, business, public health, and outdoor recreation) because the phenomenon is the same: conflict as goal interference due to differences in resources and needs or differences in values and beliefs or a combination of the two.

Added Value by Incorporating Conflict Analysis and Resolution

The potential for and the experience of conflict are characteristic of social beings, that is, they are inevitable (Kriesberg & Dayton, 2012; Pruitt & Kim, 2004; Ramsbotham, Woodhouse, & Miall, 2011; Schellenberg, 1996) . How conflict potential and realized conflicts are handled is the more important point because how they are handled will determine whether they are destructive or constructive (Cheldelin, Druckman, & Fast, 2008; Hocker & Wilmot, 2014; Kriesberg & Dayton, 2012; Pruitt & Kim, 2004). It is thus advantageous to consider how knowledge developed within the conflict resolution field can be used by others in different fields.

Tapping into the expertise of a conflict specialist is to tap into a non-judgmental approach (i.e., acknowledgment that conflict in and of itself is neutral, e.g., Schellenberg, 1996) that recognizes parties to conflict hold *subjective* perceptions of the conflict situation (Hocker & Wilmott, 2014). It is to have access to an awareness of the typical

strategies (contending, yielding, problem-solving and avoiding) used by those involved in conflict and how those strategies reflect the parties' concerns for themselves in comparison to their concerns for others (Pruitt & Kim, 2004). Once a conflict is understood through analysis, engaging in a resolution process requires not only knowledge of the steps in a conflict resolution model, but the skills to enact those steps. Involving a conflict specialist thus also creates access to effective communication and facilitation skills (e.g., Hocker & Wilmot, 2014; Katz, et al., 2011) through modeling or intentional training. These are but a few of the added benefits when intentionally incorporating conflict analysis and resolution skills. And such skills can be offered through different models of conflict resolution that have been shown to be effective, for example: one rooted in human needs theory (see Katz et al., 2011 who draw from the work of Maslow and of Burton); one designed for handling public disputes and uses conflict spiral theory (S. L. Carpenter & Kennedy, 1988); and one that utilizes a theory of change approach to move from conflict analysis to peacebuilding (Schirch, 2010).

Herein it was discussed how to extend the descriptive ORCM into the realm of conflict management simply by pairing it with a conflict resolution model (recall Figure 9). To do so, invites the field of outdoor recreation to collaborate with conflict resolution studies for the purpose of satisfying the interests of users of natural settings. To do so may enhance the likelihood that natural resources will be preserved while visitors to those natural settings will know positive experiences.

Future Research

In addition to the practical research recommendations offered throughout this chapter in association with the respective research objectives herein, there is need to

foster ways to promote the general habit of looking at a social situation and consider whether aspects of it may include the phenomenon of conflict. There is need to examine how collaborations across fields affect the effectiveness and efficiency of managing conflict – from prevention through resolution. As a practical matter, examination of how best to offer other fields, theories and practices from conflict resolution studies is warranted. Finally, approaching conflicts associated with dog presence on nature trails by augmenting the ORCM with a comprehensive conflict analysis and resolution model, may help to serve the interests of those who use and those who care for local nature trails, while *also* serving as an example of how the field of conflict resolution studies can be shared with others.

References

Abraham, C., & Sheeran, P. (2005). The health belief model. In M. Conner & P. Norman (Eds.), *Predicting health behaviour* (pp. 28-80). New York, NY: Open University Press/McGraw Hill.

Abraham, C., & Sheeran, P. (2007). The health belief model. In S. Ayers, A. Baum, C. McManus, & E. al (Eds.), *Cambridge Handbook of Psychology, Health and Medicine [electronic resource]* (2nd ed., pp. 97-101). Cambridge,UK: Cambridge University Press.

Arnberger, A., & Eder, R. (2012). Exploring coping behaviors of Sunday and workday visitors due to use conditions in an urban forest. *Urban Forestry & Urban Greening, 11*(4), 439-449. Retrieved from https://www.journals.elsevier.com/urban-forestry-and-urban-greening

Arnberger, A., Schneider, I. E., Ebenberger, M., Eder, R., Venette, R. C., Snyder, S. A., . Cottrell, S. (2017). Emerald ash borer impacts on visual preferences for urban forest recreation settings. *Urban Forestry & Urban Greening, 27*, 235-245.

Association, A. P. P. (2018). *2017-2018 APPA National Pet Owners Survey Statistics: Pet Ownership & Annual Expenses* Retrieved from https://www.americanpetproducts.org/press_industrytrends.asp

Atenstaedt, R. L., & Jones, S. (2011). Interventions to prevent dog fouling: a systematic review of the evidence. *Public Health, 125*, 90-92. doi:doi:10.1016/j.puhe.2010.09.006

Backlund, E. A., & Williams, D. R. (2004). *A quantitative synthesis of place attachment research: Investigating past experience and place attachment.* Paper presented at the Proceedings of the 2003 Northeastern Recreation Research Symposium. Gen. Tech. Rep. NE-317. US Department of Agriculture, Forest Service, Northeastern Research Station, Newtown Square, PA.

Bator, R. J., & Cialdini, R. B. (2000). The application of persuasion theory to the development of effective proenvironmental public service announcements. *Journal of social issues, 56*(3), 527-541.

Blahna, D. J., Smith, K. S., & Anderson, J. A. (1995). Backcountry llama packing: Vistor perceptions of acceptability and conflict. *Leisure Sciences, 17*(3), 185-204.

Blenderman, A., Taff, B. D., Schwartz, F., & Lawhon, B. (2018). *Final Report: Dog Guardians' Perceptions and Behaviors Related to the Disposal of Pet Waste in City of Boulder Open Space and Mountain Parks*. Retrieved from https://www-static.bouldercolorado.gov/docs/2_2_18_OSMP_Pet_Waste_Final_Report-1-201802051053.pdf

Bowes, M., Keller, P., Rollins, R., & Gifford, R. (2017). The Effect of Ambivalence on On-Leash Dog Walking Compliance Behavior in Parks and Protected Areas. *Journal of Park & Recreation Administration, 35*(3), 81-93. doi:10.18666/JPRA-2017-V35-I3-7440

Bowes, M., Keller, P., Rollins, R., & Gifford, R. (2018). Habits, beaches, dogs and leashes: Non-compliance with park regulations.

Bowling, A. (2005). Mode of questionnaire administration can have serious effects on data quality. *Journal of public health, 27*(3), 281-291.

Budruk, M., Stanis, S. A. W., Schneider, I. E., & Heisey, J. J. (2008). Crowding and experience-use history: A study of the moderating effect of place attachment among water-based recreationists. *Environmental Management, 41*(4), 528-537. doi:DOI 10.1007/s00267-007-9059-1

Carosa, K. (2017). Town of Rye cracking down on dog waste disposal, enforcing $1,000 fines. *WMUR News*. Retrieved from http://www.wmur.com/article/town-of-rye-cracking-down-on-dog-waste-disposal-enforcing-dollar1000-fines/12170743

Carothers, P., Vaske, J. J., & Donnelly, M. P. (2001). Social values versus interpersonal conflict among hikers and mountain bikers. *Leisure Sciences, 23*(1), 47-61.

Carpenter, C. J. (2010). A Meta-Analysis of the Effectiveness of Health Belief Model Variables in Predicting Behavior. *Health Communication, 25*(8), 661-669. doi:10.1080/10410236.2010.521906

Carpenter, S. L., & Kennedy, W. J. D. (1988). *Managing Public Disputes: A Practical Guide for Government, Business, and Citizens' Groups*. San Francisco, CA: Jossey-Bass.

Carter, M., & Horwitz, P. (2014). Beyond Proximity: The Importance of Green Space Useability to Self-Reported Health. *EcoHealth, 11*(3), 322-332. doi:10.1007/s10393-014-0952-9

Champion, V. L. (1984). Instrument development for health belief constructs. *Advancing in Nursing Science, April*, 73-85.

Champion, V. L., & Skinner, C. S. (2008). The health belief model. In K. Glanz, B. K. Rimer, & K. Viswanath (Eds.), *Health behavior and health education: Theory, research, and practice* (4th ed., pp. 45-65). San Francisco, CA: Jossey-Bass.

Cheldelin, S., Druckman, D., & Fast, L. (2008). *Conflict: From Analysis to Intervention* (2nd ed.). New York: Continuum.

Clark, R. N., Hendee, J. C., & Campbell, F. L. (1971). Values, Behavior, and Conflict in Modern Camping Culture. *Journal of Leisure Research, 3*(3), 143-159.

Clayton, S. D., & Saunders, C. D. (2012). Introduction: Environmental and conservation psychology. In S. D. Clayton (Ed.), *The Oxford Handbook of Environmental and Conservation Psychology* (pp. 1-7). New York, NY: Oxford university Press.

Colley, K., & Craig, T. (2019). Natural places: Perceptions of wildness and attachment to local greenspace. *Journal of Environmental Psychology, 61*, 71-78.

Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). Thousand Oaks, CA: SAGE Publications.

Creswell, J. W., & Creswell, D. J. (2018). *Research design: Qualitative, quantitative and mixed methods approaches* (5th ed.). Thousand Oaks, CA: SAGE.

Cutt, H. E., Giles-Corti, B., Wood, L. J., Knuiman, M., & Burke, V. (2008). Barriers and motivators for owners walking their dog: results from qualitative research. *Health Promotion Journal of Australia, 19*(2), 38-44.

Degeling, C., & Rock, M. (2012). 'It was not just a walking experience': reflections on the role of care in dog-walking. *Health promotion international, 28*(3), 397-406. doi:10.1093/heapro/das024

Deutsch, M. (1971). Toward an understanding of conflict. *International Journal of Group Tension, 1*(1), 42-54.

Dolesh, R. J. (2018). Dog parks: managing the waste. *Parks & Recreation Magazine, November,* 40-43. Retrieved from https://ezine.nrpa.org/html5/reader/production/default.aspx?pubname=&pubid=af405065-f846-4788-b6d6-e3a9d8f1a7b3

Eder, R., & Arnberger, A. (2012). The Influence of Place Attachment and Experience Use History on Perceived Depreciative Visitor Behavior and Crowding in an Urban National Park. *Environmental Management, 50*(4), 566-580. doi:10.1007/s00267-012-9912-8

Edwards, V., & Knight, S. (2006). *Understanding the psychology of walkers with dogs: New approaches to better management*. Retrieved from Hampshire County, England: https://researchportal.port.ac.uk/portal/files/119579/psychology-dgo-walkers.pdf

Ellement, J. R. (2020, April 30, 2020). Cambridge father who allegedly pulled knife on jogger to enforce social distancing arrested. *The Boston Globe*. Retrieved from https://www.bostonglobe.com/2020/04/30/metro/father-walking-with-two-young-children-pulls-knife-approaching-jogger-cambridge/

Field, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th ed.). Thousand Oaks, CA: SAGE Publications.

Flather, C. H., & Cordell, H. K. (1995). Outdoor recreation: historical and anticipated trends. In R. L. Knight & K. J. Gutzwiller (Eds.), *Wildlife and recreationists: Coexistence through management and research* (pp. 3-16). Washington, DC: Island Press.

Florida, H. C., & Southeast, G. (2009). *Hillsborough County pet waste research.* . Retrieved from http://www.hillsborough.wateratlas.usf.edu/upload/documents/HC-pet-waste-study-final-report.pdf

Gage, R. L. (2015). *Manager and visitor perceptions of public recreation land management.* Paper presented at the Northeastern Recreation Research Symposium.

Gage, R. L. (2016). *The role of situation awareness in examining conflict between recreational visitors and public land managers* (Dissertation). Retrieved from ProQuest Dissertations & Theses Global database. (Order No. 10154538)

Gaunt, M. C., & Carr, A. P. (2011). A survey of intestinal parasites in dogs from Saskatoon, Saskatchewan. *The Canadian Veterinary Journal, 52*(5), 497-500. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3078000/

Gibson, M. J., & Fix, P. J. (2014). Further clarification of interpersonal versus social values conflict: Insights from motorized and non-motorized recreational river users. *Journal of Outdoor Recreation and Tourism, 7-8*, 1-7. doi:https://doi.org/10.1016/j.jort.2014.09.007

Goldstein, N. J., Martin, S. J., & Cialdini, R. B. (2008). *Yes! 50 scientifically proven ways to be persuasive*. New York, NY: Free Press.

Gordon, B. S. (2018). Chi-square test. In B. B. Frey (Ed.), *The SAGE encyclopedia of educational research, measurement, and evaluation*. Thousand Oaks, CA: SAGE.

Gracyalny, M. L. (2017). Scales, Likert Statement. In *The SAGE Encyclopedia of Communication Research Methods*. Thousand Oaks, California.

Graefe, A., & Thapa, B. (2004). Conflict in natural resources recreation. In M. J. Manfredo, J. J. Vaske, B. L. Bruyere, D. R. Field, & P. J. Brown (Eds.), *Society and Natural Resources: A summary of knowledge* (pp. 209-224). Jefferson, MO: Modern Litho.

Greer, K., Day, K., & McCutcheon, S. (2017). Efficacy and perception of trail use enforcement in an urban natural reserve in San Diego,California. *Journal of Outdoor Recreation and Tourism, 18,* 56-64. doi:http://dx.doi.org/10.1016/j.jort.2017.02.002

Grier, K. C. (2006). *Pets in America: A history.* . New York, NY: Harcourt, Inc.

Haddadin, J. (2018). Framingham steps up pressure to 'Scoop the Poop'. *The MetroWest Daily News*. Retrieved from http://www.metrowestdailynews.com/news/20180601/framingham-steps-up-pressure-to-scoop-poop

Harby, A. (2010). Dogs and natures reserves: Can they co-exist? . *ECOS, 31*(2), 68-71. Retrieved from https://www.banc.org.uk/ecos/

Harrison, J. A., Mullen, P. D., & Green, L. W. (1992). A meta-analysis of studies of the health belief model with adults. *Health education research, 7*(1), 107-116.

Hicks, T. (2018). Postpositivism. In B. B. Frey (Ed.), *The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation* (pp. 1276-1278). Thousand Oaks, CA.

Hidalgo, A. E. R., & Harshaw, H. (2010). *Managing Outdoor Recreation Conflict on the Squamish, British Columbia trail network.* Paper presented at the Northeastern Recreation Research Symposium, In: Fisher, Cherie LeBlanc; Watts, Clifton E., Jr., eds. Proceedings of the 2010 Northeastern Recreation Research Symposium. Gen. Tech. Rep. NRS-P-94. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station: 134-140.

Hocker, J. L., & Wilmot, W. W. (2014). *Interpersonal Conflict* (9th ed.). New York, NY: McGraw-Hill.

Ivy, M. I., Stewart, W. P., & Lue, C.-C. (1992). Exploring the role of tolerance in recreational conflict. *Journal of Leisure Research, 24*(4), 348-360.

Jacob, G. R., & Schreyer, R. (1980). Conflict in Outdoor recreation: A Theoretical Perspective. *Journal of Leisure Research, 12*(4), 268-380.

Janz, N. K., & Becker, M. H. (1984). The health belief model: A decade later. *Health Education Quarterly, 11*(1), 1-47.

Janz, N. K., Champion, V. L., & Strecher, V. J. (2002). The health belief model. In K. Glanz, B. K. Riner, & F. M. Lewis (Eds.), *Health behavior and health education: Theory, research, and practice* (pp. 45-66). San Francisco, CA: Jossey-Bass.

Jones, C. L., Jensen, J. D., Scherr, C. L., Brown, N. R., Christy, K., & Weaver, J. (2015). The Health Belief Model as an explanatory framework in communication research: exploring parallel, serial, and moderated mediation. *Health Communication, 30*(6), 566-576. doi:10.1080/10410236.2013.873363

Katz, N. H., Lawyer, J. W., & Sweedler, M. K. (2011). *Communication and conflict resolution skills* (2nd ed.). Dubuque, IA: Kendall Hunt.

Kellner, A., Carver, S., Gramza, A., Lewis, J. S., VandeWoude, S., & Crooks, K. R. (2017). Outdoor recreation at the wildland—urban interface: Examining human activity patterns and compliance with dog management policies. *Natural Areas Journal, 37(4):515-529, 37*(4), 515-529. doi:https://doi.org/10.3375/043.037.0408

Knight, R. L., & Gutzwiller, K. J. (Eds.). (1995). *Wildlife and recreationsits: Coexistence through management and research*. Washington, DC: Island Press.

Kriesberg, L., & Dayton, B. W. (2012). *Constructive conflicts: From escalation to resolution* (4th ed.). Lanham, MD: Rowman & Littlefield.

Kyle, G., Graefe, A., Manning, R., & Bacon, J. (2004). Effects of place attachment on users' perceptions of social and environmental conditions in a natural setting. *Journal of Environmental Psychology, 24*(2), 213-225. doi:https://doi.org/10.1016/j.jenvp.2003.12.006

Lee, H.-S., Shepley, M., & Huang, C.-S. (2009). Evaluation of off-leash dog parks in Texas and Florida: A study of use patterns, user satisfaction, and perception. *Landscape and Urban Planning, 92*, 314-324.

Lenth, B. E., Knight, R. L., & Brennan, M. E. (2008). The Effects of Dogs on Wildlife Communities. *Natural Areas Journal, 28*(3), 218-227. doi:https://doi.org/10.3375/0885-8608(2008)28[218:TEODOW]2.0.CO;2

Leung, J. T., & Shek, D. T. (2018). Quantitative research methods. In B. B. Frey (Ed.), *The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation* (pp. 1349-1352). Thousand Oaks, CA.

Leung, Y.-F., & Marion, J. L. (2000). *Recreation impacts and management in wilderness: a state-of-knowldege review.* Paper presented at the USDA Forest Service Proceedings, 15, 23-48.

Libon, D. (2018). A crappy situation: Dog poo bags clog Canton drains. *patch.com*. Retrieved from https://patch.com/massachusetts/canton/crappy-situation-dog-poo-bags-clog-canton-drains

Lindsay, J. J., & Strathman, A. (1997). Predictors of recycling behavior: An application of a modified health belief model. *Journal of Applied Social Psychology, 27*(20), 1799-1823.

Lowe, C. N., Williams, K. S., Jenkinson, S., & Toogood, M. (2014). Environmental and social impacts of domestic dog waste in the UK: investigating barriers to behavioural change in dog walkers. *International Journal of Environment and Waste Management, 13*(4), 331-347. doi:10.1504/IJEWM.2014.060452

Maguire, G. S., Miller, K. K., & Weston, M. A. (2019). Only the strictest rules apply: Investigating regulation compliance of beaches to minimize invasive dog impacts on threatened shorebird populations. In *Impacts of Invasive Species on Coastal Environments* (pp. 397-412): Springer.

Manfredo, M. J., Driver, B. L., & Tarrant, M. A. (1996). Measuring leisure motivation: A meta-analysis of the recreation experience preference scales. *Journal of Leisure Research, 28*(3), 188-213.

Mann, C., & Absher, J. D. (2007). A two stage analysis of recreation conflict as a basis for management strategies in the Black Forest: a methodological contribution. *Forest, Snow, and Landscape Research 81 (1/2): 123-138, 81*(1/2), 123-138.

Mann, C., & Absher, J. D. (2008). Recreation conflict potential and management implications in the northern/central Black Forest Nature Park. *Journal of environmental Planning and Management, 51*(3), 363-380. doi:https://doi.org/10.1080/09640560801979527

Manning, R. E. (2007). *Parks and carrying capacity: Commons without tragedy.* Washington, DC: Island Press.

Manning, R. E. (2011). *Studies in outdoor recreation: Search and research for satisfaction* (3rd ed.). Corvallis, OR: Oregon State University Press.

Martin, S. R., McCool, S. F., & Lucas, R. C. (1989). Wilderness campsite impacts: Do managers and visitors see them the same? *Environmental Management, 13*(5), 623-629. doi: https://doi.org/10.1007/BF01874968

Mayer, B. (2012). *The dynamics of conflict: A guide to management and intervention* (2nd ed.). San Francisco, CA: Jossey-Bass.

McAvoy, L., Gramman, J., Burdge, R., & Absher, J. D. (1986). Understanding the causes of conflict between commercial and recreational users of the Mississippi River. *Journal of Parks and Recreation Administration, 4*, 49-60.

McHugh, M. L. (2018). Phi correlation coefficient. In B. B. Frey (Ed.), *The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation*. Thousand Oaks,, CA: SAGE.

Miller, T. A., & McCool, S. F. (2003). Coping with Stress in Outdoor Recreational Settings: An Application of Transactional Stress Theory. *Leisure Sciences, 25*(2-3), 257-275. doi:10.1080/01490400306562

Morowatisharifabad, M. A., Momayyezi, M., & Ghaneian, M. T. (2012). Health Belief Model and Reasoned Action Theory in predicting water saving behaviors in Yazd, Iran. *Health Promotion Perspectives, 2*(2), 136-144. doi:10.5681/hpp.2012.016

Nisbet, E. K., & Gick, M. L. (2008). Can health psychology help the planet? Applying theory and models of health behaviour to environmental actions. *Canadian Psychology, 49*(4), 296.

Oftedal, A., Kang, H., & Schneider, I. E. (2015). Perceptions and Responses to Conflict: Comparing Men and Women in Recreational Settings. *Leisure Sciences An Interdisciplinary Journal, 37*(1), 39-67. doi:https://doi-org.ezproxylocal.library.nova.edu/10.1080/01490400.2014.935537

Price, S., Blacketer, M., & Brownlee, M. (2018). The influence of place attachment on campers' evaluations of ecological impacts due to recreation use. *Journal of Outdoor Recreation and Tourism, 21*, 30-38. doi:https://doi.org/10.1016/j.jort.2017.11.001

Pruitt, D. G., & Kim, S. H. (2004). *Social Conflict: Escalation, Stalemate, and Settlement (3rd* (3rd ed.). New York, NY: McGraw-Hill.

Ramthun, R. (1995). Factors in user group conflict between hikers and mountain bikers. *Leisure Science, 17*(3), 159-169.

Reed, S. E., & Merenlender, A. M. (2011). Effects of Management of Domestic Dogs and Recreation on Carnivores in Protected Areas in Northern California. *Conservation Biology, 25*(3), 504-513. doi:doi:10.1111/j.1523-1739.2010.01641.x

Riley, C. J., Pierskalla, C. D., Burns, R. C., Maumbe, K. C., Graefe, A. R., Smaldone, D. A., & Williams, S. (2015). Examining OHV user displacement at the Oregon Dunes National

Recreation Area and Sand Lake: A 10-year trend study. *Journal of Outdoor Recreation and Tourism*.

Rock, M. J., Degeling, C., Graham, T. M., Toohey, A. M., Rault, D., & McCormack, G. R. (2016). Public engagement and community participation in governing urban parks: a case study in changing and implementing a policy addressing off-leash dogs. *Critical Public Health, 26*(5), 588-601. doi:http://dx.doi.org/10.1080/09581596.2016.1177635

Rock, M. J., Graham, T. M., Massolo, A., & McCormack, G. R. (2016). Dog-walking, dog-fouling and leashing policies in urban parks: Insights from a natural experiment designed as a longitudinal multiple-case study. *Landscape and Urban Planning, 153*, 40-50. doi:https://doi.org/10.1016/j.landurbplan.2016.04.018

Roggenbuck, J. W. (1992). Use of persuasion to reduce resource impacts and visitor conflicts. In M. J. Manfredo (Ed.), *Influencing human behavior: Theory and applications in recreation, tourism, and natural resources management* (pp. 149-208): Sagamore.

Rosenstock, I. M. (1974). Historical origins of the health belief model. *Health Education and Behavior, 2*(4), 328-335. doi:https://doi.org/10.1177/109019817400200403

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the health belief model. *Health Education Quarterly, 15*(2), 175-183.

Russell, R., Guerry, A. D., Balvanera, P., Gould, R. K., Basurto, X., Chan, K. M., . . . Tam, J. (2013). Humans and nature: how knowing and experiencing nature affect well-being. *Annual Review of Environment and Resources, 38,* 473-502.

Schellenberg, J. A. (1996). *Conflict resolution: Theory, research, and practice.* Albany, NY: State University of New York Press.

Schneider, I. E. (2000a). Response to conflict in urban-proximate areas. *Journal of Park & Recreation Administration, 18*(2), 37-53.

Schneider, I. E. (2000b). Revisiting and revising recreation conflict research. *Journal of Leisure Research, 32*(1), 129-132.

Schneider, I. E., Earing, J., & Martinson, K. (2013). Revealing Motivations for and Conflicts Associated with Recreational Horseback Trail Riding. *Journal of Forestry, 111*(4), 282-286. doi:10.5849/jof.12-056

Schneider, I. E., & Hammitt, W. E. (1995). Visitor response to outdoor recreation conflict: A conceptual approach. *Leisure Sciences, 17,* 223-234.

Schneider, I. E., & Wynveen, C. (2015). Exploring outdoor recreation conflict′ s role in evolving constraints models. *Journal of Outdoor Recreation and Tourism, 9,* 37-43.

Schneider, K., Guggina, P., Murphy, D., Ferrara, C. M., Panza, E., Oleski, J., . . . Lemon, S. C. (2015). Barriers and facilitators to dog walking in New England. *Comparative Exercise Physiology, 11*(1), 55-63. doi:10.3920/CEP140020

Schuster, R., Hammitt, W. E., & Moore, D. (2006). Stress Appraisal and Coping Response to Hassles Experienced in Outdoor Recreation Settings. *Leisure Sciences, 28*(2), 97-113. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=19540841&site=ehost-live

Serpell, J. (1986). *In the comapny of animals*. New York, NY: Basil Blackwell.

Sharpe, D. (2015). Chi-Square test is statistically significant: Now what? *Practical Assessment, Research, and Evaluation, 20*(8). Retrieved from http://pareonline.net/getvn.asp?v=20&n=8

Sheeran, P., Klein, W. M., & Rothman, A. J. (2017). Health behavior change: Moving from observation to intervention. *Annual Review of Psychology, 68*, 573-600.

Smaldone, D. A. (2006). The role of time in place attachment. *Proceedings of the 2006 Northeastern Recreation Research Symposium*, 47-56.

Stevens, D., & Hussmann, A. (2017). Wildlife poop versus dog poop: Explained. Retrieved from https://lnt.org/blog/wildlife-poop-versus-dog-poop-explained

Stigner, M. G., Beyer, H. L., Klein, C. J., & Fuller, R. A. (2016). Reconciling recreational use and conservation values in a coastal protected area. *Journal of Applied Ecology, 53*(4), 1206-1214. doi:10.1111/1365-2664.12662

Straub, C. L., & Leahy, J. E. (2014). Application of a modified Health Belief Model to the pro-environmental behavior of private well water testing. *Journal of the American Water Resources Association, 50*(6), 1515-1526. doi:10.1111/jawr.12217

Swann, C. (1999). *A survey of resident nutrient behavior in the Chesapeake Bay watershed.* Retrieved from http://www.myxyz.org/phmurphy/dog/DogWasteSurveyChesapeakeBay2.pdf

Terrell, S. R. (2016). *Writing A Proposal for Your Dissertation: Guidelines and Examples*. New York, NY: The Guilford Press.

Thapa, B., & Graefe, A. R. (2004). Recreation Conflict and Tolerance Among Skiers and Snowboarders. *Journal of Park & Recreation Administration, 22*(1), 37-52. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=19626687&site=ehost-live

Thomsen, J. M., Powell, R. B., & Monz, C. (2018). A Systematic Review of the Physical and Mental Health Benefits of Wildland Recreation. *Journal of Park & Recreation Administration, 36*(1), 123. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=edb&AN=128583908&site=eds-live

Tidwell, T. C. (1998). *Conflict resolved? A critical assessment of conflict resolution.* . New York, NY: Continuum.

Todd, S., & Graefe, A. (1989). *Level of experience and perception of conflict among canoeists on the Delaware River.* Paper presented at the 1989 Northeastern Recreation Research Symposium.

Toohey, A. M., & Rock, M. J. (2011). Unleashing their potential: a critical realist scoping review of the influence of dogs on physical activity for dog-owners and non-owners. *International Journal of Behavioral Nutrition and Physical Activity, 8*(1), 46.

Toohey, A. M., & Rock, M. J. (2015). Newspaper portrayals, local policies, and dog-supportive public space: who's wagging whom? *Anthrozoos, 28*(4), 549-567.

Tsaur, S.-H., Liang, Y.-W., & Weng, S.-C. (2014). Recreationist-environment fit and place attachment. *Journal of Environmental Psychology, 40*, 421-429.

Typhina, E. (2011). *An environmental communication perspective on managing dog waste: Insights from the Health Belief Model*. Washington State University. Pullman, WA.

Typhina, E., & Yan, C. (2014). Managing Dog Waste: Campaign Insights From the Health Belief Model. *Applied Environmental Education & Communication, 13*(2), 73-82. doi:10.1080/1533015X.2014.944247

Usher, L. E., & Gómez, E. (2017). Managing Stoke: Crowding, Conflicts, and Coping Among Virginia Beach Surfers. *Journal of Park & Recreation Administration, 35*(2), 9-24. doi:10.18666/JPRA-2017-V35-I2-7596

Vaske, J. J., Carothers, P., Donnelly, M. P., & Baird, B. (2000). Recreation Conflict among Skiers and Snowboarders. *Leisure Sciences, 22*(4), 297-313. doi:10.1080/01490409950202311

Vaske, J. J., & Donnelly, M. P. (2007). *Perceived conflict with off leash dogs at Boulder Open Space and Mountain Parks. (HDNRU Report No. 76). Report for Boulder Open Space and Mountain Parks*. Retrieved from Fort Collins, CO https://www-static.bouldercolorado.gov/docs/2007-conflict-off-leash-dogs-1-201304101158.pdf

Vaske, J. J., Donnelly, M. P., Wittman, K., & Laidlaw, S. (1995). Interpersonal versus social values conflict. *Leisure Sciences, 17*(3), 205-222.

Vaske, J. J., Needham, M. D., & Cline, R. C. (2007). Clarifying interpersonal and social values conflict among recreationists. *Journal of Leisure Research, 39*(1), 182-195.

Verlic, A., Arnberger, A., Japelj, A., Simoncic, P., & Pirnat, J. (2015). Perceptions of recreational trail impacts on an urban forest walk: A controlled field experiment. *Urban Forestry & Urban Greening, 14*, 89-98. doi:http://dx.doi.org/10.1016/j.ufug.2014.12.004

Vistad, O. I. (2003). Experience and management of recreational impact on the ground–a study among visitors and managers. *Journal for Nature Conservation, 11*(4), 363-369.

Walsh, J. (2011). *Unleashed fury: The political struggle for dog-friendly parks*. West Lafayette, IN: Purdue University Press.

Watson, A. E. (1995). An analyis of recent progress in recreation conflict research and perceptions of future challenges and opportuities. *Leisure Sciences, 17*(3).

Watson, A. E., Cordell, H. K., Manning, R. E., & Martin, S. (2016). The evolution of wilderness social science and future research to protect experiences, resources, and societal benefits. *Journal of Forestry, 114*(3), 329-338. doi:http://dx.doi.org/10.5849/jof.14-145

Watson, A. E., Niccolucci, M. J., & Williams, D. R. (1993). Hikers and recreational stock users: Predicting and managing recreation conflicts in three wildernesses. *Res. Pap. INT-468. Ogden, UT: US Department of Agriculture, Forest Service, Intermountain Research Station. 35 p, 468*.

Watson, A. E., Niccolucci, M. J., & Williams, D. R. (1994). The nature of conflict between hikers and recreational stock users in the John Muir Wilderness. *Journal of Leisure Research, 26*(4), 372-385.

Webley, P., & Siviter, C. (2000). Why do some owners allow their dogs to foul the pavement? The social psychology of a minor rule infraction. *Journal of Applied Social Psychology, 30*(7), 1371-1380. doi:10.1111/j.1559-1816.2000.tb02525.x

Wells, D. L. (2006). Factors influencing dog owners' reactions to their dogs' fouling. *Environment and Behavior, 38*(5). doi:10.1177/0013916505284794

Westgarth, C., Christley, R. M., & Christian, H. E. (2014). How might we increase physical activity through dog walking?: A comprehensive review of dog walking correlates. *International Journal of Behavioral Nutrition and Physical Activity, 11*, 1-14. doi:https://doi.org/10.1186/1479-5868-11-83

Westgarth, C., Christley, R. M., Pinchbeck, G. L., Gaskell, R. M., Dawson, S., & Bradshaw, J. W. S. (2010). Dog behaviour on walks and the effect of use of the leash. *Applied Animal Behaviour, 125*(1-2), 38-46. doi:10.1016/j.applanim.2010.03.007

Westgarth, C., Pinchbeck, G. L., Bradshaw, J. W., Dawson, S., Gaskell, R. M., & Christley, R. M. (2008). Dog-human and dog-dog interactions of 260 dog-owning households in a community in Cheshire. *Veterinary Record, 162*(14), 436-442.

Weston, M. A., Fitzsimons, J. A., Wescott, G., Miller, K. K., Ekanayake, K. B., & Schneider, T. (2014). Bark in the Park: A Review of Domestic Dogs in Parks. *Environmental Management, 54*(3), 373-382. doi:10.1007/s00267-014-0311-1

White, D. D., Virden, R. J., & Riper, C. J. (2008). Effects of Place Identity, Place Dependence, and Experience-Use History on Perceptions of Recreation Impacts in a Natural Setting. *Environmental Management, 42*(4), 647-657. doi:10.1007/s00267-008-9143-1

Wilderness Act, 16, U.S.C. § 1131-1136 (1964 1964).

Williams, D. R., & Roggenbuck, J. W. (1989). *Measuring place attachment: Some preliminary results.* Paper presented at the 1989 Leisure Research Symposium.

Williams, D. R., & Vaske, J. J. (2003). The Measurement of Place Attachment: Validity and Generalizability of a Psychometric Approach. *Forest Science, 49*(6), 830-840. doi:10.1093/forestscience/49.6.830

Williams, K. J. H., Weston, M. A., Henry, S., & Maguire, G. S. (2009). Birds and beaches, dogs and leashes: Dog owners' sense of obligation to leash dogs on beaches in Victoria, Australia. *Human Dimensions of Wildlife, 14*(2), 89-101.

Williams, S. E. (2007). Chi-square test for goodness of fit. In N. J. Salkind (Ed.), *Encyclopedia of measurement and statistics*. Thousand Oaks, CA.

Willis, J. W. (2007). *Foundations of Qualitative Research*. Thousand Oaks, CA: SAGE Publications.

Wilson, N. (2014). Levels of dog control and dog fouling in a large public park: Methods issues and survey results. *The New Zealand Medical Journal (Online), 127*(1406), 95.

Yoon, H. J., & Kim, Y. J. (2016). Understanding green advertising attitude and behaviorall intention: An application of the Health Belief Model. *Journal of Promotion Management, 22*(1), 49-70. doi:10.1080/10496491.2015.1107006

Appendix A: The Survey Instrument

1. **How did you receive the link to this survey? Please check one.**

   ____ The researcher gave it to me at a nature trail I was visiting.
   Please name that trail: _____
   ____ I found it publicly posted (e.g., Town Hall, Library, or pet care facility)
   ____ I saw it in a local news outlet
   _____ I saw it on Facebook
   ____ I received it in an email message

2. **Please indicate which of the following local trails you usually visit when you have your dog with you.** Place a check to the left of all that apply.

✓	Northborough Trails		✓	Westborough Trails
	Carlstrom II Forest			Sawink Farm
	Carney Park & Cold Harbor			Walkup and Robinson
	Cedar Hill			Veterans' Freedom Park
	Edmund Hill			Mill Pond
	Yellick Conservation Area			Headwaters Conservation Area
	Mt. Pisgah Trails Area			Libbey Conservation and Wile Forest
	Little Chauncey & Cedar Hill			Upper Jackstraw Brook
	Aqueduct Trail			Bowman Conservation
	Stirrup Brook			South Cedar Swamp
	Schunder's Field			Chauncey Lake
	Other Northborough Trail:			Other Westborough Trail:

3. **How often do you and your dog usually visit the trails that you checked in Question 2?** (check only one)

   — Daily
   — Every 2-3 days
   — Once per week
   — Every 2 weeks
   — Monthly
   — A few times each year

4. **Of the reasons below, which is usually the most important to you when you and your dog go to the local nature trails that you typically visit?** Please rank in order of importance with 1 being 'most important' and 5 being 'least important'.

Rank	Visit Reason
____	To enjoy the landscape and nature
____	To exercise, be physically active
____	To walk the dog(s)
____	To experience tranquility
____	To do something with my family, friends

5. **When you and your dog visit your usual local nature trail(s) …**

   a. **for how much of the time do you have your dog(s) on leash? (Check one)**

None of the time	Little of the time	About half of the time	Most of the time	All of the time
1	2	3	4	5

   b. **how often do you pick up your dog's poop? (Check one)**

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

   c. **how often do you leave bagged poop on the ground? (Check one)**

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

6. Of the following options, which one would best prompt you to pick up your dog's poop and put it in the trash during a usual visit to a local trail? (check only one)

- ☐ Natural water sources in this area will be polluted from dog poop left on the ground.
- ☐ I can be fined by the Town for leaving dog poop on the ground.
- ☐ Other dogs can get sick from dog poop left on the ground.
- ☐ It is courteous to other trail visitors to pick up and put my dog's poop in the trash.
- ☐ I don't know.
- ☐ Children can get sick from dog poop that is not collected and placed in the trash.
- ☐ Other, reason; please describe: _____

7. Of the following, which one do you think is the best reason to pick up your dog's poop and put it in the trash during a usual visit to a local trail? (check only one)

- ☐ Other dogs or people won't get sick from it.
- ☐ I don't know.
- ☐ Other reason; please describe: _____
- ☐ Elimination of unsightly dog poop.
- ☐ People won't step in it.
- ☐ Water sources won't get polluted from it.
- ☐ Elimination of foul-smelling dog poop.

8. Of the following, which one would most likely prevent you from picking up your dog's poop and putting it in the trash during a usual visit to a local trail? (check only one)

- ☐ It's not a big deal to leave dog poop on the ground.
- ☐ I don't have a bag handy.
- ☐ Other reason; please describe: _____
- ☐ It's gross and stinky.
- ☐ I'm too busy.
- ☐ There are no trash bins nearby.
- ☐ I don't know.

9. If you were to receive a message reminding you to pick-up your dog's poop and put it in the trash, during a visit to your usual local trail(s), who of the following would be most persuasive? (check only one)

- ☐ The owner of the land.
- ☐ Another trail visitor.
- ☐ I don't know.
- ☐ Another trail visitor walking with a dog.
- ☐ Someone responsible for trail upkeep (e.g., conservation agent or land steward).
- ☐ Other person: _____

10. Of the following, which would be most effective at reminding you to pick up your dog's poop and to put it in the trash during a visit to your usual local trail(s)? (check only one)

- ☐ A portable bag dispenser that I carry with me.
- ☐ Social Media Posts: for example, on Twitter, Facebook, or Instagram
- ☐ Another means; please describe: _____
- ☐ Bags conveniently available at the trail.
- ☐ I don't know.
- ☐ Waste-bins for dog poop conveniently located at trail
- ☐ Signs or images on the trail
- ☐ A phone App that sends a reminder when I am on the trail

11. Please indicate, by circling one response for each statement, the extent to which you disagree/agree with each statement:

Statement	Strongly Disagree	Disagree	Neither Disagree/ Agree	Agree	Strongly Agree
The local trails I visit most mean a lot to me	1	2	3	4	5
I am very attached to the local trails I visit most	1	2	3	4	5
I identify strongly with the local trails I visit most	1	2	3	4	5
I have a special connection to the local trails I visit most and to the people who visit them	1	2	3	4	5

12. How much of a problem would each of the following behaviors be, if you were to encounter or observe them, when you and your dog go to the local trail(s) you usually visit? Please indicate the extent to which each of the following behaviors would be a problem, by circling one option for each behavior:

Behavior	Not at All A Problem	Slight Problem	Moderate Problem	Extreme Problem
Dogs jumping on a visitor	0	1	2	3
Dogs pawing a visitor	0	1	2	3
Dogs sniffing a visitor	0	1	2	3
Dogs approaching uninvited	0	1	2	3
Dogs licking a visitor	0	1	2	3
Owners not picking up after their dogs	0	1	2	3
Owners leaving bagged poop on trail	0	1	2	3
Owners repeatedly calling their dogs	0	1	2	3
Dogs causing wildlife to flee	0	1	2	3
Dogs causing birds to suddenly fly away	0	1	2	3
Dogs off trail	0	1	2	3
Dogs "play" chasing another dog	0	1	2	3

13. How often have you actually encountered or observed each of these behaviors when you and your dog go to the local trail(s) you usually visit? Please indicate the frequency with which you encountered each behavior, by circling one option per behavior:

Behavior	Never	Sometimes	Often	Always
Dogs jumping on a visitor	0	1	2	3
Dogs pawing a visitor	0	1	2	3
Dogs sniffing a visitor	0	1	2	3
Dogs approaching uninvited	0	1	2	3
Dogs licking a visitor	0	1	2	3
Owners not picking up after their dogs	0	1	2	3
Owners leaving bagged poop on trail	0	1	2	3
Owners repeatedly calling their dogs	0	1	2	3
Dogs causing wildlife to flee	0	1	2	3
Dogs causing birds to suddenly fly away	0	1	2	3
Dogs off trail	0	1	2	3
Dogs "play" chasing another dog	0	1	2	3

Please tell us about yourself by checking the items that describe you:

1. Gender

   Female _____
   Male _____
   Other _____

2. Education

   High school or less _____
   Some college _____
   College graduate _____
   Some graduate school _____
   Master's degree _____
   Doctoral / professional degree _____

3. Place of residence

   Grafton _____
   Marlborough _____
   Northborough _____
   Shrewsbury _____
   Westborough _____
   Other: _____

4. How old were you on your most recent birthday? _____ years old.

Thank you for sharing your opinions and experiences with us!

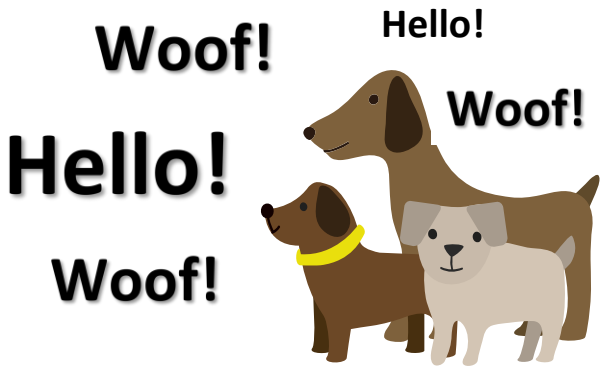
Appendix B: Research Setting Photos

Example of Northborough Trails

Example of Westborough Trails

Appendix C: Recruitment Flier

Recruitment Flier



Do you visit nature trails in Northborough or Westborough with a dog, and are you at least 18?

If yes, then you are invited to …

Share your views in a research study that is exploring the experiences, behaviors, and attitudes of visitors walking with a dog, on local nature trails. You will be asked to respond anonymously to multiple-choice questions.

For details and to complete this 10-minute survey, go to
www.surveymonkey.com/[insert survey name here]
or
[insert QR code here]

This research study, conducted by local resident, Jane Walsh, doctoral candidate at Nova Southeastern University, titled "Psychosocial Correlates of Dog-Management Behavior When Visiting a Nature Trail" provides no compensation for participation. Questions? Contact Jane at jw1982@mynsu.nova.edu

Appendix D: Trailhead Recruitment Set-up and Materials

Trailhead Recruitment Set-up

Trailhead recruitment kit included small folding table, laminated flyer, clipboard with data collection form for observations, letters of introduction from municipal officials, researcher and research assistant with name tags.

Script and protocol for in-person distribution of link to online survey

Researcher: *Hi! How's it going?*

Wait for a response; reply accordingly; then...

Researcher: *I'm Jane Walsh, I live locally, and I'm a graduate student conducting a research study. Today, I just want to let you know that the study is happening and invite you to visit this link to learn more about it and participate if you want. The study is exploring the experiences, behaviors and attitudes of folks who visit nature trails with their dogs.*

Offer the visitor the information flyer (a ½ size reduction of the flyer that is being publicly posted)

Track whether the flyer is accepted.

Researcher: *If you think you might be interested, please try to check it out within the week. And feel free to share the link with folks you know who visit trails in Northborough and/or Westborough with a dog.*

Thanks for your time!

Trailhead Observation Data Collection Form

Trail Name: _____ Date: _____ Day of Week: _____

Arrival Time: _____ AM or PM (circle one)

Departure Time: _____ AM or PM (circle one)

Research Staff Present: _____ _____

Circle letter to indicate conditions; use phone to check temperature

Weather Conditions	Upon Arrival: **S**unny/**C**loudy/**P**artly **D**ry or **W**et					Upon Departure **S**unny/**C**loudy/**P**artly **D**ry or **W**et				
Sunny	S	C	P	D	W	S	C	P	D	W
Temperature °F										

Row #	# Adults in group as they arrive (1 to …)	Apparent Gender of each adult visitor (M or F)	# of minors in group (do not ask age; guess)	# Dogs in Group (0 to…)	# Dogs on leash in parking area (0 to …)	Outcome status of flyer offer (A/R/C/N) **A**ccepted **R**ejected Already **C**ompleted **I**neligible **N**ot offered	Visitor(s) know staff **Y** or **N**	Repeat visitor known from prior visit **Y** or **N**
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
Totals:								

Comments: record row number then note anything you think important to study conditions not captured elsewhere; use other side of page if more room needed.

_____

_____

_____

Appendix E: Scripts for Email Message and Press Release

Script for email message

Subject: Dogs and Nature Trails – Research

Hello _____,

As a Northborough resident and graduate student at Nova Southeastern University, I am conducting a research study exploring the experiences, behaviors and attitudes of visitors who walk with dogs on local nature trails, in Northborough and Westborough. I am making available, in several ways, the link to the online survey. And one way is by asking people like you to forward this message to folks likely to walk local nature trails with a dog.

Anyone who walks with a dog on trails in Northborough and/or Westborough and who is at least 18 years old is eligible to participate. Interested folks (including you!) can visit

https://www.surveymonkey.com/r/trail-visitor-study

to learn more about the study and to voluntarily participate. The survey will be available for a couple of months. There is no compensation.

I have attached the promotional flyer for this project for easy reference.

I will appreciate you forwarding this message and the attached flyer to anyone who you think may be interested.

I will also welcome suggestions for other ways to make known the availability of this research opportunity. And of course, I am happy to answer any questions.

Thank you and kind regards,

Jane

Jane M. Walsh
PhD Candidate
College of Arts, Humanities and Social Sciences
Nova Southeastern University
Fort Lauderdale, FL 33314
jw1982@mynsu.nova.edu

Script for Press Release

Script for media release (05_10_2019)

For Immediate Release

[Insert Date Here]

Northborough/Westborough – Do you visit local nature trails and bring along your dog? If so, local resident, Jane Walsh, is interested in your perceptions, attitudes and experiences. She is conducting survey research exploring the reasons people visit these trails, their attachment to them and how they perceive dog-related behaviors. In addition, she is curious about the threats, benefits and barriers associated with cleaning up after a dog when on a nature path.

As a graduate student at Nova Southeastern University, Ms. Walsh designed the study with a focus on trails close to home, thus the requirement that participants call upon their experiences of walking on trails in either Northborough or Westborough. The study is entitled "Psychosocial Correlates of Dog-Management Behavior When Visiting a Nature Trail". There is no compensation for participation and questions may be directed to Ms. Walsh at jw1982@mynsu.nova.edu

Those interested in learning more or in participating, anonymously, can do so by visiting https://www.surveymonkey.com/r/trail-visitor-study

The survey is open through [insert date here].

Contact Information

Appendix F: Sample Consent Letter

College of Arts, Humanities, and Social Sciences
NOVA SOUTHEASTERN UNIVERSITY | NSU Florida

Participant Letter for Anonymous Surveys
NSU Consent to be in a Research Study Entitled
Psychosocial Correlates of Dog-Management Behavior When Visiting a Nature Trail

Who is doing this research study?

The person doing this study is Jane Walsh with the department of Conflict Resolution Studies. They will be helped by Urszula Strawinska-Zanko, PhD, Assistant Professor.

Why are you asking me to be in this research study?

You are being asked to take part in this research study because you are at least 18 years old and you visit local nature trails accompanied by a dog(s).

Why is this research being done?

The purpose of this study is to find out whether dog-management behavior on nature trails is related to activity style, lifestyle tolerance, resource specificity and/or related to perceptions of threats, benefits, barriers and reminders associated with dog-management behavior.

What will I be doing if I agree to be in this research study?

You will be taking a one-time, anonymous survey. The survey will take approximately 10 minutes to complete.

Are there possible risks and discomforts to me?

This research study involves minimal risk to you. To the best of our knowledge, the things you will be doing have no more risk of harm than you would have in everyday life.

What happens if I do not want to be in this research study?

You can decide not to participate in this research and it will not be held against you. You can exit the survey at any time.

Will it cost me anything? Will I get paid for being in the study?

There is no cost for participation in this study. Participation is voluntary and no payment will be provided.

How will you keep my information private?

Your responses are anonymous. Information we learn about you in this research study will be handled in a confidential manner, within the limits of the law. No personal identifying information will be collected. Your responses will be available to the researcher, the Institutional Review Board and other representatives of this institution, and any granting agencies (if applicable). All

confidential data will be kept securely on the local hard drive of a password-protected laptop and of a desktop computer each equipped with antivirus and malware protection; a copy will be stored on a USB flash drive in a locked, fireproof safe in the personal residence of the researcher. All data will be kept for 36 months from the end of the study and destroyed after that time by erasing files from laptop and desktop computers; data files on the flash drive will be erased and the flash drive physically destroyed.

Who can I talk to about the study?

If you have questions, you can contact the researcher, Jane Walsh at jw1982@mynsu.nova.edu or her faculty advisor Dr. Strawinska-Zanko at uzanko@nova.edu

If you have questions about the study but want to talk to someone else who is not a part of the study, you can call the Nova Southeastern University Institutional Review Board (IRB) at (954) 262-5369 or toll free at 1-866-499-0790 or email at IRB@nova.edu.

Do you understand and do you want to be in the study?

If you have read the above information and voluntarily wish to participate in this research study, please choose 'Yes'; if you are not eligible or if you do not wish to participate please select 'No'. A 'Yes' response will lead you to the survey; a 'No' response will end this interaction. After you make your selection, please click the 'Next' button.

____ Yes, I visit local trails with a dog, I am at least 18 years old, and I voluntarily choose to participate

____ No, I am not eligible because I do not visit local trails with a dog, or I am younger than 18 years old

____ No, I do not want to participate

Appendix G: Data Listing of Open-ended Responses

DATA LISTING Page 1 of 11

Data listing for open-ended responses for the option of Other, listed by Health Belief Model (HBM) factor and grouped by common theme as coded by the researcher. Responses are listed verbatim from submitted surveys.

HBM Threat: **Of the following options, which one would best prompt you to pick up your dog's poop and put it in the trash during a usual visit to a local trail? (n for Other = 13)**
All of the above • All above reasons. • All of the above - and again, I always pick up after my dog • See above!
The right thing to do • It's the right thing • It's the right thing • You wouldn't take a dump and leave it in the toilet w/out flushing why would you leave your dog's shit. It's your responsibility.
Environmental concern discourages dog waste collection • If there is no "off trail" area, I would pick it up. Otherwise, it is worse to add plastic to the world if not needed. • More information comparing impact to landfill and environment using bags to pick up dog poop vs impact to water and environment to leaving it to decompose
Miscellaneous (one instance of each) • I already pickup my dog's poop • None – I am not going off the trail to get ot • Several areas have grass that is left to grow then used for animal feed - dog poop contaminates this feed source • Self • trash bins along the trail

HBM Benefit: Of the following, which one do you think is the best reason to pick up your dog's poop and put it in the trash during a usual visit to a local trail? (n for Other = 31)

All of the above

- All equally important
- All of the above
- All of the above!!
- all of the above, except "I dont know"
- All of the above.
- All of the above. I can't stand it when others leave their dog's poop.
- All of the above. It's gross and unsanitary!
- All of them are important

The right thing to do

- It is part of the responsibility of owning a dog
- It's just the right thing to do
- It's the right thing
- It's the right thing to do
- It's just the right thing to do.
- It's my dog and leaving poop anywhere is not acceptable.
- My dog my responsibility
- So right thing
- It's the right thing to do for all above reasons.

Two or three of the choices provided among the response options

- both avoiding water pollution and sickening other dogs
- several of the options - no illness, no pollution, no stepping in it

Consideration of others

- common courtesy
- Common courtesy to others using the trail, particularly those who don't bring animals.
- Good manners
- Respect for others

Environmental Concern

- Conservation responsibility
- Responsible environmental action
- to keep our environment clean

Benefit continued…

Preserving opportunity to visit with a dog

- dog may be banned from these areas due to excessive poop.
- I want to keep access open so I comply.

Encompassed under existing option: People won't step in it

- I pick up the poop if it close to walking paths. Since the dogs range freely in the forest I can't always pick it up. I used bio-degradable compostable bags certified to a European standard. I wish there was some way of composting the poop in an industrial compost facility.

No need to pick up

- If dog pooped off of the trail then there's no reason to pick it up and bag it

Preserve trail attractiveness

- If everyone left their dogs poop around, it would be everywhere and the trail wouldn't be pleasant to visit anymore.

HBM Barrier: Of the following, which one would most likely prevent you from picking up your dog's poop and putting it in the trash during a usual visit to a local trail? (n for Other = 86)

Poop is off trail

- When he defecates off the trail in wooded areas.
- My dog is tiny and if he goes in the woods i leave it. same size as fox poop. But if on a trail i always pick it up.
- Trained the dog to poop off trail
- I don't pick up the pool that is in the woods or away from where people walk.
- If my dog poops well off the trail, I don't pick it up (trying to minimize plastic bag use). If he poops where someone might step on it, I remove the poop.
- We've. Dog goes way in woods
- If dog poops in the woods I feel that it is off the path and won't do any harm
- He is off Trail in the woods and I'm not exactly sure where he pooped
- It's not on the path so shouldn't affect anyone
- Pooped to far off the trail to get to
- Unreachable spot aka dog went in marsh
- My dogs do their business in the woods far from the trail.

- My dog pooped far out in the woods and I don't know where he went or couldn't find his poop
- As long as it is not in the trail and someone will step in it Mother Nature will take care of it
- It's not near the trails
- My dogs go deeper in to the woods, off the trail
- if the poop is off trail in the woods I believe that's fine
- If the dog is deep in the woods and not in the path of walkers, I may be tempted to leave it.
- It's far enough in the woods and not on a walking path.
- Off trail, and not near water, it's not a problem. My dog is trained to go in the woods, not on the trail.
- I rarely see anyone else on the trails I go on. My dog is off in the woods (free range) and poops far from anyone just like the coyotes, deer, bear, et al.
- Can't reach it/can't get to it. Too deep in woods off trail
- Hard to get to (i.e. my dog poops far in the woods where I can't find it or it isn't easily accessible)

DATA LISTING Page 5 of 11

Barrier continued…

- If she pooped well off-trail in the brush I might be tempted to let it biodegrade on site
- If my dog pooped 20+ feet into the woods off the trail.
- My dog pooped in the wood off trail

- Only if he's off the trail and in the woods.
- if it's in a place only accessible by dogs
- if it was in the woods, off trail
- It's earth. My dog poops way off trail like other animals in forest do every day.
- goes deep int to the woods to poop
- I would never leave poop behind, unless i believe he pooped someplace i cannot get to safely
- he poops way off the trail in the high weeds
- pooped in the woods away from path
- If the dog poops off trail...into the woods, I will leave it.
- Dog pops off trail in the woods
- The dog is off leash and poops in the woods off the trail
- My dog runs into the woods to go poop, where people don't walk.

- If the dog is way off the trail and I no one can step in it. I question whether it is better to waste plastic to pick it up versus having it biodegrade
- If she poops in the woods, I am not going in the woods amongst poison ivy, snakes (yes there are snakes), and more poison ivy. I am allergic. But, my dog typicllay goes on the trail.
- If it's in middle of woods.
- If my dog went off the trail and into the woods to poop
- my dog usually goes in the woods off trail as far as his leash allows
- My dog always goes off-trail and pretty far into bushes. I am not risking ticks to go and get it!
- if the dog went off trail and pooped in the weeds
- dog goes off trail and cannot find poop to pick up
- If it's far off the trail I do not pick it up, if it's on the trail or close to it, I pick it up
- The dog moves off into a space that is off the trails and very difficult to reach

DATA LISTING Page 6 of 11

Barrier continued…

I always pick up

- I always pick up
- None i always pick up my dogs waste
- Ridiculous, always pick up
- We bring our own bags in and out because its the right thing to do.
- none of these, every leash I own has a bag dispenser attached
- Not a big issue for me to pick the poop up and carry it out
- Nothing-no reason not to pick up and dispose.
- I pick up my dog's waste
- I don't leave poop on the ground N/A
- I always pick up my dog’s poop. I also pick up other’s bagged poop
- I not only pick up my dogs poop, but often pick up what others have left behind
- Alway pick up our's and maybe somebody else's.
- I would never leave it. I always carry extra bags with me
- I would pick up dog poop
- I would never not pick it up
- There is no reason I wouldn't pick up after my dog
- I will not leave it
- There is no reason to not pick up your dogs poop
- I always pick it up, none of these are are applicable

- Too difficult to retrieve. For example: an off leash do runs deep into the woods off the trail and may poop out of sight or out of reach. My dog is always on leash, so I am always able to pick up his poop.

Poop is too soft or runny

- Soft stool that is difficult to completely pick up
- Too runny, diarrhea
- diarrhea
- I always pick up poo, especially if it is on a trail where people/kids walk. The only exception is sometimes my dog will have a loose stool in an odd place, like in a tree stump and I don't even know how to get it out
- A rare bought of canine diarrhea
- It's diarrhea and it's deep in the grass...that's the ONLY time I've left poo.

DATA LISTING Page 7 of 11

Barrier continued…

Response falls under existing option "I don't have a bag handy"

- I always pick up poop. I suppose if I lost my bags or ran out would be the only reason…
- I forgot to bring a bag
- The only time is if I didn't realize I didn't have any bags, but I usually make sure I have them so it's not an issue

Move off trail if not already off trail

- If the dog poops well off the trail, it is not necessary to pick it up. If close to trail, I move it out of the way of walkers

Unaware dog pooped

- Unaware that dog pooped.
- Only if I didn't notice she pooped. I always pick up the poop.

Miscellaneous

- Forget to backtrack and grab the bag on the way back
- The fact that I did not know where the dog pooped.
- Concern over use of plastic bags and impact to landfills, environment.
- Bad weather conditions like rain snow or ice can make it to difficult or dangerous to pick up. Sometimes the cold can make it uncomfortable to carry a bag over a long distance (I walk about 4 miles). Trash barrels make big

difference in compliance. I and many friends are willing to pick up after others if we don't have to transport it in our cars.

DATA LISTING Page 8 of 11

HBM Messenger: **If you were to receive a message from someone, reminding you to pick-up your dog's poop and put it in the trash, during a visit to your usual local trail(s), who of the following would be most persuasive?**

All of the above

- All of the above
- All of the above
- All of them
- Anyone as always pick up and often pick up what others leave behind.
- Anyone it's gross not picking up poop
- I think all are equally persuasive.

Don't *want* a reminder

- Bad idea!
- I would not like this and would be less likely to pick it up if someone annoyingly messaged me about it
- I wouldn't want a reminder

Don't *need* a reminder

- I do not need a reminder!
- I don't need to be persuaded, the only reason I occasionally do not take my dog's bagged waste is when there are no proximal disposal areas.
- I never leave poop behind so this would not happen.
- I personally don't need to be reminded as I ALWAYS pick up after my dog
- Myself- reminding me to be courteous of nature and people walking on the trails
- Never a need, we ALWAYS pick it up, to not do so is inconsiderate, rude, and annoying
- No one would ever need to remind me to pick it up.
- No one. I ALWAYS pickup the poop
- do not need reminder it is the right thing to do.

Response falls under existing option (another trail visitor or I don't know or someone responsible for trail upkeep)

- Another trail visitor and include a sign that encourages other trail visitors to act as good samaritans by reminding people to pick up their dogs poop.

- Honestly, the only person I want approaching me about my adult responsibilities in the trail upkeep people. I def do want another visitor, with or without a dog, talking to me about poop. Just leave some bags in a bag

DATA LISTING Page 9 of 11

Messenger continued

stand with a sign that is clearly and professionally made by dog people that says take one bag per poop, and two for large poops. The hunters do not pick up their dog's poop. Would you like to approach a drunkin hunter with a rifle and tell the group of them, or one of them, that there is a bag in the stand and go scoop the poop. Remember, there is hunting going on legally and illegally. So, in the end, and to answer your question, my answer would be a trail worker who maintains the land woud be the best person to do this. I used to work the cross –
country ski trails in New Hamp and I was in uniform, professional,and kind about reminding people about responsibilities or answering questions.

- I am a veterinarian so I will ALWAYS pick up my dog's poop. I'm not really sure how best to answer this question as I think people inclined not to pick up poop are also inclined not to listen...

Reminder as a thing, not a person

- Bags and trash bins made available for the rare times I forget to bring my own.
- I wouldn't need a reminder if there were trash bins along the way
- No person. A sign
- Signage or by example not threats

Miscellaneous (one instance of each)

- This survey totally ignores that walking in the woods and not leaving poop anywhere near the trail is OK. After all, are you going to pick up all wild animal poop as well. This is very different from walking a dog near lawns or sidewalks. That's why we walk in the woods.
- N (Researcher's Note: this is an illegible response; only the letter N was entered.)

DATA LISTING Page 10 of 11

HBM Reminder -Media: Of the following options, which one would be most effective at reminding you to pick up your dog's poop and to put it in trash during a visit to you usual local trail(s)?

Reminder not needed

- Don’t need a reminder. I pick it up!
- I always pick up
- I do not need to be reminded. I always pick it up
- I don't need a reminder.
- i don't need a reminder. I always pick it up when it is on the trail. In the woods I don't bother. Very tiny dog.
- I don't need to be reminded.
- I just do it. We bring our own bags in and home to dispose of it
- I'd always pick up my dog's poop so I really don't need any reminder.
- Just do it
- None, responsible adults should not need a reminder to pick up their dog's waste
- Not needed
- Self

Simultaneous use of two existing response options

- Bags and discrete signage.
- Bags and disposal bins available.
- Bags and waste-bins
- Signs and collection bins

Reminder not needed, but these help

- again i don't need the reminder but having bags available at the trail is super handy incase i run out
- I don't need reminding as I ALWAYS curb my dog but waste bins are helpful

Penalty Enforcement

- Dog officer on trail giving fines to those off leash. Off leash dogs make it impossible for the owners to clean up after the dogs.
- I feel that for those who do not pick it up now, there may be no incentive, they just do not care. Maybe if someone was monitoring the trail and they got fined by the town but that is not a practical solution
- Threat of penalty

DATA LISTING Page 11 of 11

Reminder continued…

No need to pick up

- See above comments. Poop well off trail in forest does not need to be picked up. You must be thinking of walking where poop will be on or near trail. Then I totally agree it should be picked up.

- I rarely see anyone else on the trails I go on. My dog is off in the woods (free range) and poops far from anyone just like the coyotes, deer, bear, et al.

Response falls under existing option (Bags conveniently at trail)

- Waste bins work for me but then you get the itiots who throw everything in the bins and someone then has to clean up the mounting issues because people are derilict. So, provide poop bags and have people donate them to the cause. People should bring their own. If you own a pet, then take care of your pet. The other conveniences are only for repsonsible people and about 1/2 the folks out on the Chauncy trails are responsible. Sorry, to say, but, I have been walkngthe trails for thirty years... between the broken glass, diapers, old casings from the hunters and their beer cans, plus the Dunkin Donut fans who throw their cold brews about, I say promote self-responsibility. That is it.

Response does not address the question

- Any poop left on a trail should be picked up. I don't feel the need to go into the woods off trail to pick up poop. All the wild/natural animals leave theirs wherevever. My dog is up to date on vaccinations, etc. so I don't feel it is adding any more disease than the wild creatures do to the environment.
- Need to be convinced
- People need to use common sense

End of data listing for open-ended responses