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Sizing up physical activity: The relationships between dog characteristics, dog owners' motivations, and dog walking

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ABSTRACT

Objective: Regular dog walking is likely a symbiotic relationship between the needs of the dog and its owner. This relationship has seen limited attention. The purpose of this study was to examine the relationships between dog characteristics, dog owners' perceptions of responsibility and attachment to their dogs, and the qualities of dog owner exercise motivations (self-determined regulations) with dog walking behavior.
Method: Participants were 228 adult dog owners who completed an online survey that included demographics, dog walking, dog responsibility/attachment and exercise regulations.
Results: Using mediation procedures, the results showed that the owner's sense of dog walking responsibility and walking relationship was completely mediated by identified (indirect $\beta = .06$; bootstrapped lower CI $= .02$, bootstrapped higher CI $= .17$) and intrinsic ($\beta = .05$; bootstrapped lower CI $= .01$, bootstrapped higher CI $= .15$) regulations but these regulations could not account for substantial variance in the dog-related factors. Instead, intrinsic regulation ($\beta = .27$), identified regulation ($\beta = .20$), dog size ($\beta = .22$), and energy level of the dog ($\beta = .13$) all contributed to explain 30% of walking behavior.
Conclusion: A sense of responsibility to walk the dog, generally the most reliable correlate in past dog walking research, appears to align with more self-determined forms of motivation than controlled. The findings, however, support the premise that dog walking behavior may be a complex mix of human and dog-related factors. This dog and owner relationship may need consideration for successful future dog walking promotion initiatives.

Regular physical activity (PA) offers many health benefits including protection against cardiovascular disease, diabetes, cancer, obesity, hypertension, and depression (Warburton, Nicol, & Bredin, 2006). The World Health Organization (WHO, 2015) recommends at least 150 min of moderate-to-vigorous intensity physical activity (MVPA) per week as optimal to improving fitness and health, and to reduce the risk of non-communicable diseases and depression. Walking is undoubtedly one of the best forms of PA that can be achieved easily by many people without high costs involved (Fogelholm, 2005). Walking is a natural, convenient, and multi-purpose activity that helps with disease prevention and contributes to the maintenance of physical independence and well-being throughout the years; walking also serves as a low-cost and environmental-friendly mode of transportation (U.S. Department of Health and Human Services, 2015). Without the need for special skills or equipment, walking appears to be one of the best options for increasing physical activity in sedentary and/or older populations.

A popular walking activity appears to be walking with one's dog. Indeed, dog owners have been found to walk at least 1.6 times per week more than non-dog owners, with similar findings replicated across studies conducted in various countries (Christian et al., 2013). While these findings are interesting, only 27% of dog owners were walking frequently and long enough per week to accrue 150 min of dog walking per week (Reeves, Rafferty, Miller, & Lyon-Callo, 2011) and more than half of dog owners are still not walking their dogs (Christian et al., 2013). Understandably, as the incumbent costs and responsibilities may not be appropriate for people without dogs to obtain dogs to facilitate walking, interventions targeting dog walking — among existing dog owners — stands as a viable approach to increasing physical activity.

When examining the promotion of dog walking, it is important to consider that it may be unique from ordinary walking without a

dog because dog walking depends and arises on a partnership between the dog and its owner. Dog-specific outcome expectancies regarding the benefits of dog walking for the dog, self-efficacy, and social support were identified by dog owners as important factors to dog walking (Richards, McDonough, Edwards, Lyle, & Troped, 2013). Further, a recent review on the correlates of dog walking showed that the dog-owners who perceived strong attachment and responsibility/obligation to walk their dogs were more likely to walk their dog (Westgarth, Christley, & Christian, 2014). Presently, the state of canine literature involving human related factors does not provide information to depict how the perception of responsibility and attachment to one's dog relates to dog owners' motivation, and the construct may represent considerable breadth in its characterization from attachment to responsibility and obligation (Westgarth et al., 2014).

Self-determination theory (SDT) is a model for understanding the quality of motivation that underlies human behavior and it has had strong validation in PA research (Teixeira, Carraça, Markland, Silva, & Ryan, 2012). SDT proposes that motivation can be viewed as a continuum from amotivation to purely extrinsic, to intrinsic. Intrinsically motivated activities are regarded as fun and enjoyable (e.g., a dog owner who walks their dog because they find dog walking a pleasurable activity). On the contrary, extrinsic motivation is defined as engagement in a behavior in order to attain some outcome separable from the activity itself, while amotivation reflects a lack of motivation and non-regulation altogether (e.g., a dog owner who views walking their dog as a waste of time). Extrinsic motivation also follows a spectrum from controlled to more autonomous forms. At the most controlled end of the spectrum lies external regulation, in which a person's actions are compelled or driven by externally controlled rewards or punishments (e.g., a dog owner who walks their dog because they reckon others would not be pleased with them if they did not) followed by introjected regulation, which is based on internal rewards and punishments (e.g., a dog owner who feels like a failure if they have not walked their dog). Further along the spectrum lies identified regulation, in which the person identifies with or personally values the behaviors they engage in (e.g., a dog owner who regards the health importance of walking their dog regularly). This represents a more autonomous form of extrinsic motivation as behaviors regulated through identification are hypothesized to persist independently of environmental rewards and will be better maintained. Finally, integrated regulation represents the most autonomous form of extrinsic motivation and concerns the assimilation of identified regulation so that engaging in the behavior is fully congruent with one's sense of self (Markland & Tobin, 2004).

Self-determined regulations have not been examined within dog walking research and gaining insight into the qualities of exercise motivation among dog owners in relation to their dog walking behavior should help us better characterize where dog responsibility and attachment fall along that spectrum. For example, fulfilling walking as part of a larger identity of pet care (identified regulation) or, by contrast, the feeling of responsibility could help formulate feelings of obligation and duty and engender more guilt-bound motivation (introjected regulation). One would hope that perceptions of attachment and responsibility drive more autonomous forms of walking motivation than controlled, but this research question needs attention.

In addition to the findings of dog responsibility as a key correlate of dog walking, Westgarth et al. (2014) also show that dog-related factors may be important to dog walking behavior, potentially independent of owner-related motivation for walking. Dog owners who owned dogs needing more exercise based on breed recommendations, younger dogs, and dogs of medium-to-large sizes, were found to walk more per week than dog owners who owned less active breeds of dogs, older, or smaller dogs (Degeling, Burton, & McCormack, 2012). To date, no study has yet examined the perceived energy level of the dog and how this would impact the motivation of the dog owner. While the exercise requirements of dogs are often correlated with breed type (Degeling et al., 2012) and chronological age of the dog (Westgarth et al., 2014), one would assume that each dog possesses its own level of energy (Bastian, 2015) that is partially independent of breed type, dog size, and chronological age. Thus, it may be helpful to understand the relative contributions of individual dogs' energy level to the qualities of exercise motivation among dog owners.

Therefore, the purpose of this study was to examine the relationships between dog-related factors, dog owners' sense of dog responsibility and attachment, and qualities of human walking motivations (self-determined regulations) that may impact dog owners' walking behavior. Based on the extant research and theory, we hypothesized (a) dog responsibility and dog attachment will correlate with more autonomous forms of motivation than controlled regulations; (b) dog walking will be predicted by more autonomous than controlled regulations; (c) energy level of the dog will be associated with dog walking behavior independent of dog size and age; and (d) the relationship between dog characteristics and responsibility aspect and behavior will be at least partly mediated through autonomous forms of motivation but some aspects of dog characteristics may have direct effects on dog walking.

1. Method

This study received ethical approval from the Human Research Ethics Board at the University of Victoria. Participants were given details of the study and asked for their informed consent online before proceeding to answer the questionnaire which was published online between December 2013 and January 2014. Due to the anonymity of the survey and incentive involved, the survey settings were set to reduce the chances of multiple responses from the same respondent; access to the survey was limited to one time per computer.

1.1. Participants and procedures

Participants were English-speaking male and female adults, aged 18 years and above, who lived in Greater Victoria, British Columbia, Canada, and who owned at least one healthy dog between 1 to 7 years of age. The Canadian Veterinarian Association (2007) classifies dogs between 1 and 7 years as adult dogs; hence, dogs under 1 year of age and senior dogs beyond 7 years of age were excluded due to the larger variability in health status and physical ability to walk regularly and consistently with their owners.

Recruitment took place primarily through the social media channel of Facebook. The link to the online survey was sent to several local dog rescue organizations and canine-related pages on Facebook asking for the link to be shared on their page and passed on freely. Posters with details of the study, researcher contact information, and a link to the online survey were posted in venues such as recreation centers, the local university campus, libraries, and selected veterinary clinics. In-person recruitment and flyer handouts also took place in dog parks. For every completed response that matched the eligibility criteria, one dollar in Canadian currency was donated to a local dog rescue of the respondent's choice.

1.2. Instrumentation

Demographic information of participants such as age, sex,

income, race, education level, health status, smoking status, and height and weight were asked in the online questionnaire. Dog-related demographic information such as age, size, energy level, breed information, health status, weight, and training history were also asked.

1.2.1. Dog walking measure

Dog walking was measured using an adapted version of the Godin Leisure-Time Exercise Questionnaire (GLTEQ; Godin & Shephard, 1997), based on prior walking research (Rhodes, Brown, & McIntyre, 2006; Rhodes, Courneya, Blanchard, & Plotnikoff, 2007) and dog-walking studies (Brown & Rhodes, 2006). Participants were asked to recall their average weekly dog walking frequency and duration over the past week. The adapted GLTEQ measure used in this study contained three open-ended questions asking for the average frequency and duration of mild, moderate and strenuous intensity leisure-time dog walking during the past week. Descriptions of mild, moderate and strenuous (vigorous) intensities were given for leisure-time dog walking. Only responses to moderate-vigorous intensities were retained for analysis commensurate with public health recommendations. The dog walking measure was also modified from the Godin Leisure Time Exercise Questionnaire's (Godin & Shephard, 1997) assessment of bouts of 15 min to bouts of 20 + minutes for vigorous intensity and 30 + minutes for moderate intensity in accordance with the American College of Sport Medicine (2015) guidelines. These bouts were then aggregated to form a composite total frequency of MV bouts of dog walking.

1.2.2. Dog responsibility measure

Dog responsibility was measured using the aggregate scores for the following two questions from the study by Brown and Rhodes (2006) and one question from the Dogs and Physical Activity Tool (DAPA Tool; Cutt, Giles-Corti, Knuiman, & Pikora, 2008): *"I feel an obligation to walk my dog regularly"; "I feel a responsibility to walk my dog regularly"*, and *"Having my dog makes me walk more"*. Each of these three questions was rated on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*). The reliability scale between these three items had a Cronbach's Alpha of .91.

1.2.3. Dog attachment measure

Dog attachment was created and measured using the aggregate scores from the following seven questions in the DAPA Tool (Cutt et al., 2008). *"I consider my dog a friend", "I talk to my dog", "Owning a dog adds to my happiness", "I talk to others about my dog", "I often play with my dog", "My dog knows how I feel about things"* and *"My dog is considered part of the family"*. Each of these seven questions was rated on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*). The reliability scale between these seven items had a Cronbach's Alpha of .86.

1.2.4. Exercise regulation measures

Qualities of dog owners' exercise motivation were measured using adapted questions from the Behavioral Regulation in Exercise Questionnaire 2 (BREQ-2; Markland & Tobin, 2004). The BREQ-2 has five subscales measuring external regulation, introjected regulation, identified regulation, intrinsic regulation, and amotivation. Each of the BREQ-2 items was reformatted to measure dog-walking behavior and was rated on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*). The aggregate scores for external (α = .72), introjected (α = .76), identified (α = .77), intrinsic (α = .92) regulations all had acceptable scale reliabilities. Amotivation had a scale reliability of α = .76. Examples of revised BREQ-2 items for each subscale are as follows: external regulation -*"I engage in dog walking because other people say I should"*; introjected

regulation - *"I feel guilty when I don't walk my dog"*; identified regulation - *"I value the benefits of dog walking"*; intrinsic regulation - *"I walk my dog because it is fun"*; amotivation - *"I don't see why I should have to walk my dog"*.

1.2.5. Dog characteristics measures

Size of dog was measured by asking participants to read from a list of examples, to select the description that best suited their dog, and to write their answer in a response box. Examples of dog size descriptions and their closest associated dog breeds for reference were given as follows: *"small-sized dogs - Chihuahuas, Dachshunds, Jack Russell Terriers, Pomeranians"; "medium-sized dogs - Australian Shepherds, Border Collies, English Bulldogs"; "large-sized dogs - Boxers, German Shepherds, Golden Retrievers, Siberian Huskies"; "giant-sized dogs - Bullmastiffs, Great Danes, Newfoundlands, Saint Bernards"* (Dog Channel, 2015; Royal Canin, 2013).

Energy level of dog was measured using a 5-point Likert scale (1 = *low energy*, 2 = *low-to-medium energy*, 3 = *medium energy*, 4 = *medium-to-high energy*, 5 = *high energy*). Examples of dog energy levels were given as follows and participants were asked to select one answer that best applied to their dog: *"Low energy dogs - these dogs are the canine equivalent of a couch potato, content to snooze the day away"; "Medium energy dogs - these dogs can adapt to laying around or going for long walks"; "High energy dogs - these dogs are always ready and waiting for action. They have the stamina to put in a full workday and need a significant amount of exercise and mental stimulation. They are more likely to spend time jumping, playing and investigating any new sights and smells"* (Oliver's Pet Care, 2015).

1.3. Analysis plan

IBM SPSS 22 software (IBM Corp., 2013) was utilized for analysis. Descriptive statistics were obtained for the sample of dog owners and dogs. Next, correlations, means, and standard deviation values were obtained for all dependent and independent variables. A regression analysis was performed using total moderate-to-vigorous intensity (MV) dog walking per week as the dependent variable and each of the self-determined regulations as independent variables. A similar regression analysis was performed with dog-related factors as independent variables (i.e., age of dog, size of dog, and energy level of dog). Subsequently, a PROCESS mediation analysis following the bootstrap mediation procedures of Hayes (2013) was performed. The number of bootstrap samples for bias corrected bootstrap confidence intervals was 1000 and the level of confidence for all confidence intervals in output was 95.00. Total MV dog walking was entered as the dependent/outcome variable "Y" for the analysis. In the first regression, size of dog was entered as the independent variable "X", identified and intrinsic regulations were entered as the "M" variables, and energy level of dog and dog responsibility were entered as covariates to account for their prediction of the dependent variable. In the second regression, energy level of dog was entered as the independent variable "X", identified and intrinsic regulations were entered as the "M" variables, and size of dog and dog responsibility were entered as covariates. In the final regression, dog responsibility was entered as the independent variable "X", identified and intrinsic regulations were entered as the "M" variables, and size of dog and energy level of dog were entered as covariates. Significance level was set at p < .05 and the effect size with Cohen's criterion was used to evaluate the results.

2. Results

A total of 228 eligible respondents completed the online survey. Most were females (88.5%) and Caucasians (98.5%). The mean age of respondents was 43.11 (*SD* 12.34) years. Of the 228 respondents,

53.5% were full-time employed, 11% were retired, 26.8% had completed university level education, 40.8% reported annual household incomes between $50,000 to $100,000, 25.9% reported annual household incomes between $100,000 and $150,000. The majority of the respondents reported their health status as "good" (36.6%) to "very good" (37.6%), the mean body mass index (BMI) was 25.6 (SD 5.03), 92.9% were non-smokers. Giant dogs represented 2.2% of the sample, followed by 35.5% large dogs, 34.6% of medium-sized dogs, and 27.6% of small dogs. The mean age of dogs was 3.87 (SD 1.78) years. All dogs were reported to be in good health (100%) with the percentage of dogs within the normal weight category standing at 94.7%.

Dog owner demographic variables, such as age ($r = -.03$; $p = .69$), sex ($r = .04$; $p = .58$), race ($r = .01$; $p = .89$), and income ($r = -.00$; $p = .97$), did not correlate with the dependent variable and thus were not entered as covariates. The total MV dog walking variable (dependent variable) was normally distributed and met the statistical assumption of normality (Howell, 2011). Descriptives and correlations among the main variables of interest can be found in Table 1. Total MV dog walking was significantly correlated with size of dog, energy level of dog, dog responsibility, identified regulation, intrinsic regulation, and inversely correlated with amotivation ($p = .00$).

For the regression analysis of SDT regulations predicting dog walking, both identified regulation ($β = .25$; $p = .01$) and intrinsic regulation ($β = .30$; $p = .00$) significantly predicted total MV dog walking (see Table 2.). A similar regression analysis (see Table 3) performed for dog-related characteristics showed size of dog ($β = .24$; $p = .00$) and energy level of dog ($β = .22$; $p = .00$) significantly predicted total MV dog walking.

The integrated path model from the PROCESS mediation analysis is featured in Fig. 1 and the analysis results displayed in Table 4. The perception of responsibility over walking one's dog had a direct effect on intrinsic motivation ($β = .18$; $p = .01$), explaining 6% of its variance, but neither dog size ($β = .03$; $p = .63$) nor energy level of dog ($β = .13$; $p = .06$) contributed to the regression equation. Although energy level of dog was not significant, the results indicate that it was close to having a significant effect on intrinsic motivation. Somewhat similar, responsibility also had a direct effect on identified regulation ($β = .31$; $p = .00$) yet energy level of the dog

Table 2
Regression table – Dog walking motivation regulations predicting MV* Dog walking.

SDT predicting MV dog walking	F	df	R^2	B	β	SE	Sig.
	13.37	5	.23				.00
External Regulation				.23	.05	.28	.43
Introjected Regulation				.11	.04	.19	.55
Identified Regulation				1.54	.25	.55	.01
Intrinsic Regulation				1.24	.30	.33	.00
Amotivation				.09	.01	.66	.88

Note: *MV = moderate-to-vigorous intensity.

Table 3
Regression table – Dog factors predicting MV* Dog walking.

Dog factors predicting MV dog walking	F	df	R^2	B	β	SE	Sig
	10.62	3	.13				.00
Age of Dog				.00	.02	.01	.82
Size of Dog				.76	.24	.21	.00
Energy Level of Dog				.61	.22	.19	.00

Note: *MV = moderate-to-vigorous intensity.

also had a small but significant effect ($β = .15$; $p = .02$), explaining 14% of its variance. Size of dog did not contribute significantly ($β = .01$; $p = .91$) to the prediction of identified regulation. For the subsequent prediction of dog walking, intrinsic regulation ($β = .27$; $p = .00$), identified regulation ($β = .20$; $p = .01$), dog size ($β = .22$; $p = .00$), and energy level of dog ($β = .13$; $p = .03$) all contributed to explain 30% of its variance, but responsibility did not contribute significantly ($β = -.01$; $p = .85$) to the equation. As one would expect from the observed path model, size of dog was not mediated through intrinsic or identified regulation (bootstrapped lower CI = −.04, bootstrapped higher CI = .07). By contrast, energy level of dog showed a small mediated effect through identified regulation (indirect $β = .03$; bootstrapped lower CI = .00, bootstrapped higher CI = .10) but not intrinsic regulation (bootstrapped lower CI = −.00, bootstrapped higher CI = .09). Dog responsibility, however, showed small mediation effects through both identified (indirect $β = .06$; bootstrapped lower CI = .02, bootstrapped higher CI = .17) and intrinsic regulation ($β = .05$; bootstrapped lower CI = .01, bootstrapped higher CI = .15). When taken together with the non-

Table 1
Correlations.

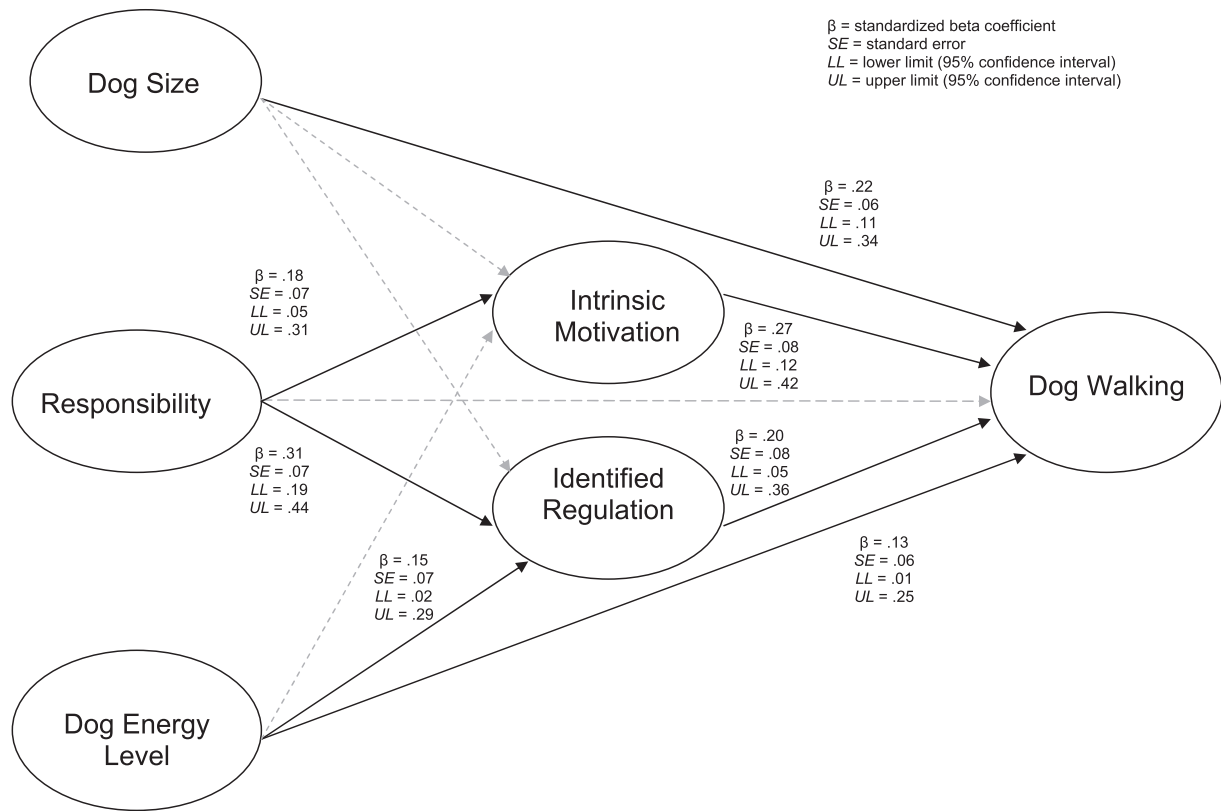|	2	3	4	5	6	7	8	9	10	11	Mean	SD
1. MV* dog walking (frequency)	−.03	.29	.28	.18	.09	−.09	.12	.42	.43	−.21	4.52	2.69
Sig. (2-tailed)	.67	.00	.00	.01	.16	.17	.08	.00	.00	.00		
2. Age in Months		.03	−.21	.06	.50	−.05	−.01	.04	.09	.08	46.41	21.31
Sig. (2-tailed)		.63	.00	.40	.45	.42	.89	.57	.20	.23		
3. Size of Dog			.25	.09	.07	−.07	.05	.08	.09	−.10	2.12	.84
Sig. (2-tailed)			.00	.19	.28	.32	.42	.21	.20	.19		
4. Energy level of dog				.20	−.02	−.13	.06	.22	.18	−.23	3.52	.98
Sig. (2-tailed)				.00	.73	.07	.43	.00	.01	.00		
5. Dog responsibility					.20	−.12	.02	.37	.25	−.21	4.71	.63
Sig. (2-tailed)					.00	.07	.80	.00	.00	.00		
6. Dog Attachment						−.16	.05	.03	.18	−.05	4.69	.48
Sig. (2-tailed)						.02	.42	.67	.01	.42		
7. External Regulation							.09	−.33	−.26	.40	1.51	.63
Sig. (2-tailed)							.18	.00	.00	.00		
8. Introjected Regulation								.22	.05	−.07	3.47	.88
Sig. (2-tailed)								.00	.45	.32		
9. Identified Regulation									.64	−.53	4.70	.43
Sig. (2-tailed)									.00	.00		
10. Intrinsic Regulation										−.37	4.43	.64
Sig. (2-tailed)										.00		
11. Amotivation											1.12	.29
Sig. (2-tailed)												

Note: *MV = moderate-to-vigorous intensity.

Fig. 1. Integrated path model. This figure illustrates the relationships between variables.

Table 4
Mediation analysis of dog factors, identified and intrinsic regulations, and MV* Dog walking.

Predicting identified regulation	F	df	R²	β	SE	Sig.	95% CI
	11.82	3	.14			.00	
Dog Responsibility				.31	.07	.00	.19−.44
Size of Dog				.01	.07	.91	- .12−.14
Energy Level of Dog				.15	.07	.02	.02−.29
Predicting Intrinsic Regulation	**F**	**df**	**R²**	**β**	**SE**	**Sig.**	**95% CI**
	4.85	3	.06			.00	
Dog Responsibility				.18	.07	.01	.05−.31
Size of Dog				.03	.07	.63	- .10−.17
Energy Level of Dog				.13	.07	.06	- .01−.26
Predicting MV* Dog Walking	**F**	**df**	**R²**	**β**	**SE**	**Sig.**	**95% CI**
	18.03	5	.30			.00	
Identified Regulation				.20	.08	.01	.05−.36
Intrinsic Regulation				.27	.08	.00	.12−.42
Dog Responsibility				- .01	.06	.85	- .13−.11
Size of Dog				.22	.06	.00	.11−.34
Energy Level of Dog				.13	.06	.03	.01−.25

Indirect Effects

Size of Dog on MV* Dog Walking:
Total Indirect Effect = .01; CI = −.04 − .07
Specific Indirect Effect Through Identified Regulation = .00; CI = −.02 − .04
Specific Indirect Effect Through Intrinsic Regulation = .01; CI = −.03 − .05
Energy Level of Dog on MV* Dog Walking:
Total Indirect Effect = .07; CI = .00−.14
Specific Indirect Effect Through Identified Regulation = .03; CI = .00−.10
Specific Indirect Effect Through Intrinsic Regulation = .03; CI = −.00 − .09
Dog Responsibility on MV* Dog Walking:
Total Indirect Effect = .11; CI = .04−.26
Specific Indirect Effect Through Identified Regulation = .06; CI = .02−.17
Specific Indirect Effect Through Intrinsic Regulation = .05; CI = .01−.15

Note: MV* = moderate-to-vigorous intensity.

significant direct effect on dog walking, the results suggest that the relationship between dog walking and dog responsibility is completely accounted for in this study through its covariance with intrinsic and identified regulation.

3. Discussion

This study marks the first examination, to our knowledge, of the quality of motivation for dog walking and an integrative model of human and dog-related factors that predict walking. It also represented an exploration of the quality of motivation, whether controlled or autonomous, that characterizes dog responsibility/attachment, which has been the most reliable predictor of dog walking in past research (Westgarth et al., 2014).

First, it was hypothesized that dog responsibility and dog attachment would correlate with more autonomous forms of motivation than controlled regulations. This hypothesis was supported. Dog owners who indicated a strong sense of responsibility towards their dogs also reported higher intrinsic and identified regulation, but no relationship with external or introjected regulation. Thus, owners appear to value the benefits of dog walking and enjoy the activity, and walking did not occur as a result of duty-bound guilt but rather from the achievement of personally valued outcomes analogous to the objectives found within autonomous forms of regulations. Evidently, dog owners' engagement in dog walking was not solely obligatory and this lends some support to the notion that dog walking is not merely an onerous and/or unpalatable activity. This finding also suggests that the nomenclature of dog obligation (cf. Brown & Rhodes, 2006) is probably not an appropriate label moving forward; rather, dog responsibility may convey the autonomous aspects of this construct better.

The second hypothesis that dog walking would be predicted by

more autonomous than controlled regulations was also supported. Dog owners who valued the benefits of dog walking and who enjoyed walking their dogs engaged in more dog walking per week. This SDT application is new to the dog walking research literature, but completely concordant with prior applications of social cognitive theory (Richards, Ogata, & Ting, 2015) and the theory of planned behavior (Brown & Rhodes, 2006) that have shown links between affective attitude/enjoyment and instrumental attitude/outcome expectations and dog walking (Westgarth et al., 2014). The finding is also similar to most SDT research in the physical activity domain, which has shown that autonomous forms of motivation are better predictors than controlled forms of motivation (Teixeira et al., 2012).

Westgarth et al. (2014) highlight that dog-related factors may be important to walking behavior, potentially independent of owner-related motivation for walking. Our third and fourth hypotheses support this theorizing and demonstrate how dog walking is a unique form of physical activity. Owners of larger dogs and higher energy dogs, independent of breed, performed more MV dog walking per week compared to dog owners who owned smaller dogs or dogs with lower levels of energy. These findings add to what was found in previous studies regarding breed exercise recommendations and breed size of dogs (Degeling et al., 2012; Reeves et al., 2011; Schofield, Mummery, & Steele, 2005). Of further interest, both of these factors contributed to dog walking independent of human motivations toward walking. Specifically, while dog owners who felt responsible towards their dogs ultimately engaged in higher intensities of dog walking per week because they personally valued the benefits of dog walking and genuinely savored the activity itself, the characteristics of the dog had an independent effect on walking outcomes.

On a less positive note, when it came to meeting WHO recommended guidelines for MVPA (WHO, 2015), only 40.8% of dog owners in this sample were walking sufficiently and at the appropriate intensities. This means more than half of dog owners were still not walking their dogs at intensities and amounts sufficient for themselves to receive health benefits (Christian et al., 2013). Thus, interventions upon dog walking appear very important. We also speculate that our findings suggest that honing in onto a sense of responsibility for dog ownership would seem suited to build upon SDT's three needs of autonomy, relatedness, and competence (Teixeira et al., 2012). Future research is needed to examine the value of these strategies and their outcomes.

Additionally, some selection of dogs may be beneficial for those interested in maximizing dog walking as a means of obtaining regular physical activity. Commensurate with prior research (Westgarth et al., 2014), larger breeds and higher energy dogs appear to convey the most utility for promoting regular MV walking, presumably because these dogs are more demanding to owners through their behaviors and individual personalities that display a need for higher levels of physical activity.

Further studies are needed to test these assumptions.

3.1. Limitations of the present study

Despite several novel research questions, this study had limitations. The study design was cross-sectional and could only provide snapshot information during the time period within which responses were being collected. The primary recruitment channel being Facebook provided several advantages such as time- and cost-effectiveness, the ability to reach the target population through dog-related Facebook pages and groups, the ease and effectiveness of snowball recruitment through Facebook cross-posting and sharing functions, and the convenience for respondents to access and respond to the survey from home, on vacation, or while on the go using mobile devices. However, utilizing Facebook as the primary recruitment channel may also have been a limitation as it may have excluded dog owners who had limited to no internet or computer access. In addition, the survey link may only have been accessible and passed on to dog owners who were internet- and social-media savvy, and by the same token, the possible snowball sampling resulting from participants connecting with and recruiting similar others via sharing the survey link on their Facebook pages would have resulted in a potential sample bias.

While majority of the demographic information collected in this study were comparable to the Greater Victoria census data (Statistics Canada, 2015), findings from the mostly female sample in this study may not generalize to males. Additionally, this sample does not generalize to all cultures or other geographic regions due to its large Caucasian sample and the relatively milder climate of Greater Victoria, BC. Given that 94.7% of dogs in this study were of normal weight amidst the current canine obesity epidemic (Courcier, Thomson, Mellor, & Yam, 2010), a potential bias of dog sample in this study may also have been a limitation. The use of self-reported walking measures was another limitation (Prince et al., 2008) and its use could have led to biased responses as well as the under- or over-reporting of physical activity levels and intensities. Replication of the study with direct assessment of walking, such as with the use of accelerometers or pedometers, is needed. Finally, the use of the BREQ-2 questionnaire did not include measures for integrated regulation (Markland & Tobin, 2004). This is unlikely to change the main findings of the study (i.e., autonomous vs. controlled motivation) but might even have served to provide more specific information on the quality of the autonomous motivation. It does appear that dog walking could be a very integrated activity amalgamated with the value of pet ownership, and future research should consider including the measures of integrated regulation.

3.2. Conclusions

Dogs depend on their owners to take them out for walks and this study found that dog owners who personally valued the benefits of dog walking for their dogs and who truly enjoyed walking with their dogs engaged in more regular dog walking behavior compared to dog owners who did not value the benefits nor obtained enjoyment from the dog walking activity. Thus, while the dog responsibility and obligation variable has been well-established in previous studies (Brown & Rhodes, 2006), this study sheds light on the distinguishing and positive qualities of human motivation and its association with dog walking. Interestingly, this study also showed that dog factors relate to walking independent of human motivation. In addition, dog factors such as individual energy level of the dog are also independent of the dog's chronological age and physical size. Hence, a small-sized high energy dog has the ability to propel its owner to engage in more walking as can a medium-to-large dog who lives to run and chase. Future interventions in this area should accentuate dog walking as an investment in quality time and an opportunity to bond with one's dog.

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