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Pet ownership, physical activity and mental health among people in opioid maintenance treatment: A prospective, observational study

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Summary

Background. Animal-assisted therapies, in which patients interact with various types of animals as part of a treatment intervention, may have positive effects on mental health symptoms. Suppose contact with animals outside of the treatment setting – such as owning a pet – could lend the same positive effects for people receiving outpatient opioid maintenance treatment. In that case, pet ownership may be supported by clinicians for current patients. This article explores the relationship between pet ownership, physical activity, and mental health. **Methods.** The data used is drawn from the larger NorCOMT study: a prospective, observational study. NorCOMT includes 14 Norwegian OMT institutions from 2012 to 2016 and self-reports at treatment start and one year after. Data from 174 patients followed up were included in this analysis. We compared self-reported physical activity, mental health, and substance use by pet owner category, distinguishing between dog owners, other types of pet owners, and those who owned no pets. **Results.** 18% of the sample owned a dog, 13% owned another type of pet, and 69% were non-owners. These groups did not differ according to sociodemographic or substance-related variables. Dog owners were more physically active, followed by other pet owners. In bivariate analyses, other pet owners had poorer mental health than dog owners and non-dog owners. Exploring physical activity: in an adjusted logistic regression that included mental health, dog ownership predicted higher physical activity. **Conclusions.** While dog ownership is associated with greater physical activity in this sample of OMT patients, there is no clear relationship between dog or other pet ownership and mental health.

Key Words: Opioid maintenance treatment; animals; pet ownership; physical activity; mental health.

1. Introduction

Systematic reviews consistently show opioid maintenance treatment (OMT) to result in significant improvements in the lives of people with opioid use disorder, compared to no treatment [1, 12, 19, 21, 25]. From the reduction in infectious disease transmission and criminal activity [11, 27, 31] to the improvement of social functioning and treatment retention [6, 10, 17, 23, 26], nothing speaks louder in favour of OMT than the observed reduction in opioid-related overdose deaths and the patient's life expectancy increase [3, 33]. In this complex treatment context, life circumstances

not often paid attention to regarding a patient's daily life can be important factors leading to a successful treatment path.

Most people in OMT have mental or physical multi-morbidities [18, 22]. Physical activity is an evidence-based intervention to improve a range of mental, physical, and substance-specific outcomes among the OMT population [34]. Outside of OMT, physical activity is one of the cornerstones of contemporary public health policies and health promotion. Its benefits to general physical health are well documented, and initiatives to promote more “active

lives” have been part of the global health strategy for many decades. More recently, physical activity has also gained a central role in mental health promotion as a key factor that promotes a better Quality of Life (QoL) in general and as an alternative for concrete mental health strategies such as active coping [5, 34]. As a cost-effective intervention with a relatively low risk of adverse events, physical activity is increasingly recommended as an adjunct treatment within OMT and other types of SUD treatments [13].

Chekroud et al. [4] show that the correlation with decreased mental health burden was most prominent when physical activity was conducted for about 45 minutes, 3-5 days per week. These results are aligned with current WHO guidelines [8]. For those with complex health challenges, such as persons with opioid use disorder in OMT, a strengthened focus on lifestyle factors, including physical activity, has the potential to prevent or halt further decline in health and is increasingly viewed as a fundamental factor for positive treatment outcomes.

Despite the range of positive outcomes, adherence to physical activity is famously difficult for all types of patient groups [14, 16, 28]. Because of this, there is a need to understand how best to support adherence to physical activity interventions. One novel intervention or exposure may be exposure to animals that require their own physical activity, such as dogs that need regular walks. In Scandinavia, Mullersdorf et al. [24] performed a study based on data from a postal public health survey in central Sweden in 2004, not limited to OMT or SUD patients. The research shows that pet owners – especially dog owners – reported significantly higher levels of a minimum of 30 minutes/day of rapid walking. Conversely, respondents who reported performing moderately strenuous exercise were more likely to have a pet. One small, randomised trial demonstrated that cardiometabolic health improved among community-dwelling adults after acquiring a dog [29], and a case-controlled study reported nearly 3000 extra steps of walking daily for dog owners compared to non-owners [7].

While the connection between pet ownership and greater physical activity is logical, and the causal link between physical activity and improved mental health is established, there is an unclear relationship between pet ownership and mental health. Recent systematic reviews report mixed findings among observational studies, with no reviews able to conduct a meta-analysis: Maurice et al.’s review found less anxiety among community-dwelling older adults with dogs but no difference in levels of depression [20], while Brooks et al.’s review of companion animals for people with mental health problems reported a mix of outcomes [2]. One of the most recently published cross-sectional studies, Tan et al., also found that pet

owners in Singapore were more physically active but did not have better general health scores [32].

Randomised controlled trials of animal-assisted treatment, in which patients interact with various types of animals as part of a treatment intervention, appear to have a low risk of adverse events. Still, evidence is limited among the SUD population. One observational study of horse-assisted therapy found higher retention rates for SUD treatment as a whole [15], while a subsequent randomised trial conducted by the same team and in the same setting found no effect on treatment retention [9]. Nevertheless, if contact with animals outside of treatment provision – that is, pet ownership – could lend any positive benefits, then it may be worth supporting OMT patients’ contact with animals.

In this paper, we investigate pet ownership and implications for OMT patient’s health status, paying particular attention to the reported physical activity levels and their mental health.

We have two aims:

1. To explore the profiles of pet owners in OMT, distinguishing between dog-owners, other types of pet owners, and those who owned no pets.
2. To explore the relationship of pet ownership to physical activity and mental health.

2. Methods

2.1. Design, setting and participants

This article draws data from the larger Norwegian Cohort of Patients in Opioid Maintenance Treatment (NorCOMT) study, which is a prospective, observational study described further in Muller et al. [22] and Skjærvø et al. [30]. In Norway, opioid maintenance treatment is universally available and free of charge. The Norwegian OMT patient group comprises mostly those with a primarily illicit opioid use background.

Between 2012 and 2016, 14 OMT institutions in Norway invited all incoming patients to participate in NorCOMT. This article is based on the answers given by the 174 participants included in the initial (T0) and 12-month follow-up (T1).

2.2. Measures

Quantitative data was collected using a structured questionnaire that included a battery of validated measures at the initiation of treatment and study inclusion (T0) and again after 12 months (T1). Measures used in our analysis included the Hopkins Symptoms Checklist (HSCL-25) with a 1.0 cut-off for clinical distress. Two novel topics were physical activity and pet ownership. Participants reported pet ownership only once, at T1, including the type of pet(s) and

their reason for having pet(s). They also reported how often they participated in physical activity. Many participants asked whether walking their dog counted as exercise, and interviewers instructed them to count these walks as exercise if they themselves perceived them to be exercise.

2.3. Analysis strategy

To answer aim 1, we divided our sample according to those who reported not owning any pets when queried, those who reported owning only dogs, and those who reported owning another type of pet. We then compared sociodemographic and substance use variables across these three pet ownership groups, using chi squares and analyses of variance (ANOVA) tests with post-hoc subgroup analyses.

To answer aim 2, we compared physical activity and mental health variables between the three pet ownership groups. We conducted a logistic regression with any physical activity as the dependent variable. We entered the following independent variables: dog owner category (three distinct variables), HSCL-25, gender, age, and other sociodemographic variables. We reported adjusted R2 as model fit.

2.4. Ethics

NorCOMT data was an observational study approved by the Norwegian ethics committee (ref. 2012/1131/REK) and did not involve the provision of treatment or influence treatment. Participants were informed at both the study start and follow-up that their withdrawal from the study was possible and would not impact their treatment. Written informed consent was collected.

3. Results

3.1. Social and substance profiles of pet ownership

Of the entire sample of 174, 69% (124) were non-owners. 18% (31) had one or more dogs, with or without other pets, while 13% (21) owned any other type of pet or pets (not dogs).

Owners were asked to select from a list of potential reasons for owning a pet. The majority of dog owners answered “liking animals” (19/31), as did just over half of other pet owners (11/21). A history of simply “always having animals” was more common for dog owners (14/31) than for other pet owners (4/21). The table below displays all the reasons reported (**Table 1**).

Men dominated the sample (74.2%), and the mean age was 40 years (range 21-65, SD). The sample did not differ according to pet ownership status by any sociodemographic or substance-related variables, as displayed in the table below. A minority were employed, about half had children, and the vast majority were stably housed. Nearly all were currently in treatment and had used a median of three substances or medications in the past half-year. These were most commonly cannabis, illicit benzodiazepines, alcohol, and prescribed benzodiazepines (**Table 2**).

3.2. Pet ownership, physical activity, and mental health

Physical activity frequency every week differed according to pet ownership category, $F(2,172) = 20.545$ $p < 0.001$, as displayed in **Figure 1**. Non-dog pet owners were the most inactive (67% report no days of exercise in an average week), followed by non-pet owners (40%). Dog owners were the most active daily (61%) and were less inactive (23%) (**Figure 1**).

Regarding the type of physical activity, those who owned dogs reported a high frequency of cardiovascular activity (56%), while non-pet owners

Table 1. Reason for owning a pet (multiple reasons allowed)

	Dog owner (n=31)	Other animals (n=21)*
Total of answers **	80	41
Friendship	13	7
Safety	11	5
Liking animals	19	11
Easier to relate to animals compared to humans	11	2
Always had animals	14	4
No reason, don't know, other, non-specified	12	13

*Excluding dogs

**21 reported owning 2 different types of animals, 2 reported 3 or more types of animals

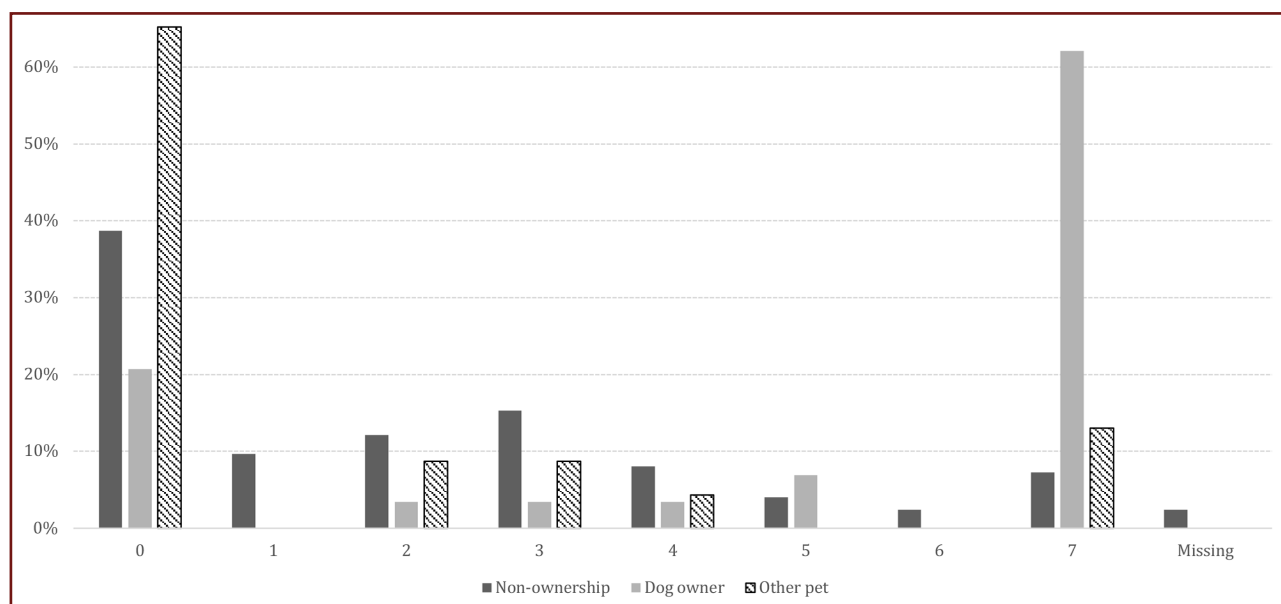


Figure 1. Physical activity frequency (days/week) for pet ownership categories

were more likely to report strength-based activities and multiple activities. Non-dog pet owners had the lowest relative frequency in almost all categories of physical activity. When looking at the reasoning for owning a pet, all pet owners had comparable frequency of reasoning in most categories. Dog owners score slightly higher in safety, easier relations, and habit (always had animals) (**Table 3**).

Mental distress scores differed significantly according to pet ownership status ($F(2,173)=4.909, p=0.008$). After conducting post-hoc tests, the differences lay between other types of pet owners and the remaining groups. Other types of pet owners had higher mental distress compared to non-owners (0.458 points higher, on a 0-4 scale) and compared to dog owners (0.745 points higher). Dog owners' and

Table 2. Demographics, exercise reported by dog-ownership status, for a sample of OMT patients one year after treatment start (Norway, 2014-15; N=176)

	None (n=124)	Dog owner (n=31)	Other animals (n=21)	Test statistic
Demographics				
Women	25.8% (32)	11 (35.5%)	5 (23.8%)	$\chi^2(2,176)=0.911, p=0.634$
Age (SD)	38.6 (8.8)	40.0 (12.0)	38.1 (9.6)	$F(2,175)=0.093, p=0.911$
Employed	20 (16.1%)	5 (16.1%)	2 (9.5%)	$\chi^2(2,176)=0.922, p=0.631$
Has children, n (%)	63 (50.8%)	16 (51.6%)	12 (60.0%)	$\chi^2(2,176)=1.425, p=0.490$
Living alone, n (%)	70 (56.5)	31 (41.9)	14 (66.7)	$\chi^2(2,176)=3.250, p=0.197$
Stable housing last 4 weeks, n (%)	114 (91.9)	29 (96.7)	18 (85.7)	$\chi^2(2,176)=1.542, p=0.463$
Substance-related variables				
Currently in treatment	113 (91.1)	28 (90.3)	21 (100)	$\chi^2(2,176)=2.356, p=0.308$
Number of substances, median (IQR)	3 (1-4)	2 (0-3.5)	2 (1-3)	Indep. samples median test (2,174)=1.093, p=0.579
Substances/medications among the four most used last 6 months				
Alcohol, n (%)	28 (22.6)	4 (12.9)	5 (23.8)	$\chi^2(2,176)=1.101, p=0.577$
Cannabis, n (%)	52 (41.9)	18 (58.1)	9 (42.9)	$\chi^2(2,176)=2.666, p=0.264$
Illicit benzodiazepines, n (%)	43 (34.7)	9 (29.0)	5 (23.8)	$\chi^2(2,176)=2.189, p=0.335$
Prescribed benzodiazepines, n (%)	28 (22.6)	3 (9.7)	5 (23.8)	$\chi^2(2,176)=2.189, p=0.335$
Illicit opioids, n (%)	5 (4.0)	2 (6.5)	1 (4.8)	$\chi^2(2,176)=0.447, p=0.800$

Table 3. Types of physical activity - n (%)

	None (n=124)	Dog owner (n=31)	Other animal (n=21)*
Type of physical activity			
Total responses	121	36	9
Cardiovascular	39 (32%)	20 (56%)	3 (33%)
Strength	34 (38%)	6 (17%)	3 (33%)
Organized sport	14 (12%)	1 (3%)	1 (11%)
Other	12 (10%)	3 (8)	1 (11%)
Multiple	22 (18%)	6 (17%)	1 (11%)

non-owners' scores did not differ with statistical significance (**Table 4**).

Only dog ownership had a significant relationship in a logistic regression predicting the likelihood of physical activity. Dog ownership compared to no dog ownership (either ownership of another pet(s) or no pet at all) increased the odds of physical activity by 2.88 (95%CI 1.13-7.30). However, the overall model fit was low, and only 5.3% of the variance was explained with the variables included in **Table 4** (**Table 5**).

4. Discussion

In this observational study that followed up with 176 OMT patients one year after having entered treatment, we examined whether different types of pet owners were more likely to be more physically active and have better mental health than non-owners. We found a dose-response relationship between pet ownership and physical activity, in which dog owners were more likely to be active and active at higher frequencies, followed by owners of other pets, and then by non-owners, who were most likely to be inactive. However, this pattern was not observed in mental health: dog owners and non-pet owners both had better mental health than other types of pet owners. Therefore, while any type of pet ownership may support physical activity, pet ownership does not have a clear relationship to mental health.

Most of the patient group does not own a pet, but of those who do most own a dog. We found a clear association between owning a dog and having a higher level of physical activity. Over half of those who own dogs participate in daily physical activity. This coincides well with Tan [32], which shows that pet owners have better physical health than non-pet owners. On the other hand, having a non-dog pet seems to be connected to lower levels of physical activity, even compared to non-pet owners. This corresponds with results from Muller [22]. Naturally, owning a dog is also connected to performing more cardiovascularly-based activities. Typically, these activities happen outside the home, such as walking the dog. In comparison, owners of non-walkable pets perform more activities that can be executed at home, for example, strength-based activities.

There seems to be a pattern where the type of activity follows the natural living conditions of the type of pet. Pets which need physical activity give their owner a natural incentive to perform the given activity, while owners of more sedentary pets prefer activities that allow them to stay close to their animal or for many, no physical activity at all. The opposite might also be true, that owners choose a pet that already fits with their preferred lifestyle. While most reasons for pet ownership are comparable between types of pet, pet owners with walkable pets score higher on safety. This might underline the need to choose activities that allow them to be close to their animal.

Table 4. Pet ownership and mental health

	None (n=124)	Dog owner (n=31)	Other animals (n=21)	Test statistic
Mental health variables				
HSCL-25 mean score (SD)	1.28 (0.85)	0.99 (0.68)	1.74 (1.06)	F(2,173)=4.909, p=0.008
Severe anxiety last 4 weeks, % (n)	37.9% (47)	34.5% (10)	56.5% (13)	χ^2 (2,176)= 3.213, p=0.201
Severe depression last 4 weeks, % (n)	26.6% (33)	24.1% (7)	47.8% (11)	χ^2 (2,176)=4.637, p=0.098

Table 5. Logistic regression predicting physical activity at T1

Independent variables (T1)	Odds ratio	95% CI	p-value
Dog ownership (ref: no dog ownership)	2.877	1.134, 7.297	0.026
Mental distress (HSCL25)*	1.004	0.989, 1.012	0.578
Female (ref: male)	0.776	0.379, 1.588	0.488
Age*	0.988	0.954, 1.022	0.476
Employed (ref: no)	0.616	0.251, 1.509	0.289
Lives alone (ref: no)	0.664	0.349, 1.263	0.212
Stable housing past 4 weeks (ref: no)	0.999	0.966, 1.025	0.733
Has children (ref: no)	1.005	0.974, 1.038	0.744

Pseudo R²; Odd ratio: 0.0537; *Continuous variable

The study does not allow for differentiating between walking as a means of transportation and walking for the sake of exercise, making it challenging to know which percentage represents a healthy habit and which represents a need (to walk the dog). The usage of benzodiazepines, both illicit and licit, seems to lessen with increased physical activity regardless of pet ownership.

This study contributes to the larger research field's overall mixed findings regarding pet ownership and mental health in population samples and other chronic disease samples. Given the friendship dynamic between owners of dogs and their pets, it is surprising that a positive association was not observed, although a tendency, probably due to the small sample size and statistical power, can be noted. One explanation may be that dogs are not socially regarded as appropriate in many settings, so owners may spend more time isolated at home, which may have a negative effect on mental health. Or there may be a selection mechanism occurring, in which people with different levels of mental health select different types of pets.

Very few studies report quantitative evidence on pet ownership and physical activity among OMT patients. This study brings evidence from a national representative sample. Thus, our results can contribute to a better understanding of the overall effect of pet ownership on health outcomes within the OMT patient group. Nevertheless, the results from this study must be interpreted considering the overall original NorCOMT caveats. It should be noted that the sample size used is too small to do advanced analysis due to limited statistical power.

5. Conclusions

In this sample of middle-aged nationally representative OMT patients in Norway, one-third owned a pet. There was no clear relationship between pet ownership and mental health. However, pet ownership was positively associated with both more physical activity

and less sedentary activity. On this basis alone, pet and particularly dog ownership could be encouraged.

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Contributors

CH, GS, and TC were equally involved in the study’s conceptualisation. CH wrote the first draft of the manuscript. GS and AEM performed the statistical analysis. GS advised the first author. TC reviewed and revised the manuscript. AEM critically reviewed the first draft. All authors approved the final manuscript.

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Conflict of interest

There are no notable competing interests.

Ethics

Authors confirm that the submitted study was conducted according to the WMA Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects. Ethics approval was granted by the Norwegian Regional Ethics Committee (REK 2012/1131). All study participants have given their informed consent to participate in the NorCOMT study on which this article is based and to publications of materials that may be issued as a result.

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