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ORIGINAL ARTICLE

The feasibility of brief dog-assisted therapy on university students stress levels: the PAwS study

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Abstract

Background: Pet therapy is becoming increasingly popular and is used in a variety of ways from encouraging communication in older adults to improving wellbeing in those with serious mental illness. Increasingly Universities have been offering pet therapy to students in an effort to reduce stress. However, little evidence currently exists to support the effectiveness of reducing measurable stress levels after a standalone drop-in unstructured session. The University of Sheffield's Counselling Service works in partnership with Guide Dogs for the Blind to give students access to calm, well-trained animals for informal group stress relief.
Aims: To assess the feasibility of implementing and evaluating unstructured group interventions with a Guide Dog in training within the university student population.
Methods: One hundred and thirty-one students who attended pet therapy at the University Counselling Service were recruited on a voluntary basis to take part in the research. Stress, measured on the state trait anxiety inventory, and blood pressure were taken before and after a 15-min intervention.
Results: All measures showed a statistically significant reduction immediately after the intervention.
Conclusion: Short interactions with a Guide Dog in training appear to reduce stress in University students. A controlled study is required to investigate further.

Background

Pet therapy as a therapeutic phenomenon has grown rapidly in recent decades with animal-assisted interventions being implemented across a range of healthcare environments, particularly those in mental health and wellbeing settings. Interventions in these settings have demonstrated outcomes such as enhanced socialisation, stress reduction and improvement in general wellbeing, emotional dysfunction, and behavioural difficulties (Munoz Lasa et al., 2011) whilst benefits have been observed across the clinical population lifespan (Barker & Dawson, 1998; Bernabei et al., 2013; Stefanini et al., 2016). From Autistic Spectrum Disorders (Kern et al., 2011; O'Haire, 2013) to severe mental illness (Barker & Dawson, 1998; Kamioka et al., 2014; Maujean et al., 2015; Wisdom et al., 2009), the literature increasingly indicates there is value in the facilitation of human–animal contact within

interdisciplinary clinical practice. This therapeutic framework has resulted in the use of terms such as ''pet therapy'', ''animal-assisted therapy'' and ''animal-assisted activities'', referring to a reciprocal dynamic between humans and animals which addresses ''physical and/or emotional needs'' (Adams, 2010; Carmack, 1984). It is recognised that each may vary with regards to the duration of intervention, setting, target population and format (Grandgeorge & Hausberger, 2011).

The time required for potential benefits of human–animal interaction to be observed may be minimal. Healthcare professionals who interacted with a dog for as little as five minutes showed reduced biological markers of stress, as measured by salivary and serum cortisol levels; optimal measures were obtained 45 minutes after the interaction whereby cortisol readings were significantly lower than baseline (Barker et al., 2005). Studies have also found mental health inpatients with mood and psychotic disorders to display significant reductions in anxiety on the State-Trait Anxiety Inventory (STAI) (Spielberger, 1983) after a 30-min animal-assisted therapy session (Barker & Dawson, 1998). These findings were not replicated in a condition examining patients with substance misuse, however, further research has found interaction with a dog reduced anxiety in patients hospitalised with physical illness (Coakley & Mahoney,

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2009). Beyond the clinical population, recent years have seen the concept of pet therapy progress into the educational sector through use of sessions with a therapy dog as a stress reduction technique (Crossman & Kazdin, 2015).

Research utilising the student population to examine potential psychosocial, psychological and biological benefits is infrequent, and there are gaps in knowledge around effectiveness, type of interaction and dosage (Crossman & Kazdin, 2015). A recent study did find that students who attended animal-assisted therapy for an eight week course reported less homesickness and increased satisfaction and the dogs created a relaxing, soothing environment, however no measure of stress was reported (Binfet & Passmore, 2016). A randomised control trial with students stressed by an examination period reported significant decreases in perceived stress after 15 min with a dog, although there were no changes in salivary cortisol levels (Barker et al., 2016). Similarly, studies have found university students report lower levels of anxiety and loneliness following engagement with a therapy dog, along with improvements in the perception and accessibility of counselling services (Daltry & Mehr, 2015; Stewart et al., 2014). Interacting with a dog for seven to ten minutes led to significant reductions in state anxiety as measured by the STAI, no change was observed in the control conditions (Crossman et al., 2015). These findings are supported by the positive subjective feedback received at universities implementing pet therapy programmes (Bell, 2013; Reynolds & Rabschutz, 2011); though it is apparent further research is required to better understand the role human–animal interaction plays in an educational setting.

Broadly, human–animal contact has also been associated with direct cardiovascular benefits (Allen et al., 2002), though findings are not yet conclusive. One study showed that positive interaction with a dog increased plasma β-endorphin, oxytocin, prolactin, phenyl acetic acid and dopamine serum levels concurrent to a decrease in serum cortisol levels; this led to significant reductions in arterial blood pressure after an average time of 15 min interaction (Odendaal & Meintjes, 2003). Observations of lowered blood pressure are thought to be indicative of a decrease in sympathetic nervous system activity, which can be subsequently linked to calming experiences (Ganong, 1995; Odendaal & Meintjes, 2003). Supporting this, high blood pressure is considered a major risk factor for cardiovascular disease due to heightened sympathetic activity (Souter & Miller, 2007) and elevated blood pressure, at least in the short-term, can be caused by stress (Dickinson et al., 2008). Interestingly, physiological benefits have been found to occur regardless of Pet Attitude Scale scores suggesting biological effects (i.e. lowered blood pressure) arise independently of psychological and psychosocial outcomes (Charnetski et al., 2004; Marcus, 2013).

Despite these findings, physiological outcome measures are relatively overlooked in existing literature methodology: of 169 papers reviewed in a meta-analysis examining the effectiveness of animal-assisted interventions for patients with depression, only nine utilised physiological measures (Souter & Miller, 2007). Indeed, limitations and problems with studies in this field are not uncommon. A meta-analysis (Nimer & Lundahl, 2007) found only 29 of 250 studies were

methodologically able to meet a minimal standard of rigor (Herzog, 2011). Studies are consistently limited by small sample sizes, inconsistent participant randomisation, selection bias and attrition rates (Kamioka et al., 2014; Morrison, 2012). Nonetheless, these limitations are combined with a broad spectrum of interventions, participant pools and environments to generate findings into the outcomes associated with animal-assisted therapies (Palley, O'Rouke, & Niemi, 2010).

The present study implemented a pragmatic design, using existing ''pet therapy'' sessions at The University of Sheffield's Counselling Service, to determine if short (10–15 min) unstructured group interventions with a Guide Dog in training is long enough to produce measurable reductions in the stress levels of a university student population. Blood pressure was measured, alongside the STAI, as a physiological measure of stress. Previous sessions have attracted 150–200 students over a three-hour session. Preliminary feedback from these sessions has shown subjective levels of stress significantly decreased immediately following interaction with a therapy dog. Qualitative feedback suggests five main responses from students: (1) expressions of happiness, (2) relaxation, (3) a connection with the dogs, (4) interaction with pets as a new experience (predominantly applicable to international students), and (5) a request for the Counselling Service to repeat the event (Counselling service, unpublished data).

Methods

Research question

Is it feasible to measure if interacting with Guide Dogs in training for 10–15 min in a group setting produces a reduction in stress levels in university students?

Objectives

- Determine if it is possible to get sufficient numbers of students to complete surveys and submit to having their blood pressure taken whilst waiting to see the Guide Dogs and to stay afterwards to complete the post intervention measures.
- Determine if 10–15 min interaction is long enough to measure a clinically significant and statistically reliable change in stress levels, as measured on the state part of the STAI.
- Determine if 10–15-min interaction is long enough to measure a change in blood pressure.

Feasibility study plan

All the students who attended the University of Sheffield's Counselling Service Pet Therapy event were asked to complete a questionnaire and had their blood pressure taken before and after interacting with the Guide Dogs.

Attendance at the event is entirely voluntary, it is advertised University wide to all students and staff. As only a few students can be with the Guide Dogs at any one time, queues form outside the building. People in the queue were asked if they would like to participate in the study. The

University Counselling Service advertise the pet therapy sessions on their website and Facebook. This included information that the day was to be researched and students may be asked to take part so that they had advanced notice. It also stated that they do not have to and can see the dogs regardless.

Measures

The primary outcome measure was the STAI (Spielberger, 1983). It consists of two scales, the state anxiety inventory (S-anxiety) and the trait anxiety inventory (T-anxiety). Trait anxiety is relatively stable and refers to a person's anxiety-proneness whereas State anxiety is a person's emotional response to a situation (Spielberger, 1983). Normative means for college students are S-anxiety male 36.47 (SD 10.02, alpha 0.91), female 38.76 (SD 11.95, alpha 0.93), T-anxiety male 38.30 (SD 9.18, alpha 0.90), female 40.40 (SD 10.15, alpha 0.91) (Spielberger, 1983). As well as the STAI and blood pressure, demographic questions about their age, course (undergraduate or postgraduate), nationality (UK, EU and non-EU), gender and pet ownership were asked. They were assigned a unique identifier so that their data is anonymous but the post intervention score can be linked to the pre intervention score.

Procedure

Students waited in the queue to see the dogs. The research procedure was explained including that taking part (or not) would not affect their time with the dogs, or any further interactions with the counselling service in any way. Any student who agreed to take part was asked to complete a questionnaire (STAI) and have their blood pressure taken.

Groups of six students then get 15 min with one or two young Guide dogs in training.

Pet therapy sessions have been run within the service before. This intervention will not be changed for this feasibility study. Researchers were not in the room with the students and the dogs. Once the students leave the room with the dogs, any students who completed baseline measures before seeing the dogs were asked to complete the STAI State scale and have their blood pressure taken again.

The dogs were Guide Dogs in training and the handlers were all Guide Dog trainers. Each dog had its own handler. The handlers would chat with the students and answer any questions they had. They were not instructed to encourage any interaction between the students and the dogs, that was up to the student. If the dogs became tired or needed a break the handlers took them out of the room.

Ethical approval for the project was granted by the departmental research ethics committee on behalf of the University. Informed consent was sought from all the participants.

Analysis

The analysis was a two stage process. The primary objective was a feasibility one – can sufficient numbers of participants be recruited to the study and would they remain after seeing the dogs to complete the after measures?

Securing high-recruitment rates meant we could conduct further analyses to look for a difference in the before and after scores and to see if any of the demographics may predict outcome.

Statistically reliable change (Jacobson & Truax, 1991) is a way of determining if the change is likely to be real or simply an artefact due to the unreliability of the instrument. A reliable change index (RCI) can be determined for each measure, it is a variation on the standard error (Evans et al., 1998). If the client's score on the measure changes between the initial and end of therapy reading by more than the RCI, then we can be confident that in 95% of cases, this change will be real and not due to error in the measure, (i.e. it is statistically significant).

$$\text{SEdiff} = \text{SD1} \times \sqrt{2} \times \sqrt{1 - \alpha}$$

where the SD1 is the standard deviation of the baseline measurement and α is Cronbach's alpha (a measure of internal reliability).

Clinically significant change (Evans et al., 1998) can be estimated using the clinical and normative distributions of the state anxiety inventory. This will calculate if a client has moved from the clinical distribution to a normative population distribution

$$CSC = \frac{(\text{meanclin} \times \text{SDnorm}) + (\text{meannorm} \times \text{SDclin})}{\text{SDnorm} + \text{SDclin}}$$

Normative data was gathered from published norms and clinical data comes from the sample in question.

Paired t tests were used to see if there was a significant difference between before and after state anxiety inventory scores and blood pressure.

Given the large number of students, Cohen's d was calculated for change on the state anxiety part of the STAI scale and for both systolic and diastolic blood pressure readings

$$\text{Cohen's } d = (M_1 - M_2)/SD_{\text{pooled}}$$

where M_1 = mean at time 1, M_2 = mean at time 2, SD = standard deviation and $SD_{\text{pooled}} = \sqrt{((SD_1^2 + SD_2^2)/2)}$

Results

Data were collected on 10th October 2016. Approximately 180 students attended the event. This was slightly lower than the year before when nearly 250 attended; this was likely due to inclement weather (waiting students stand in line in the street with no cover from the rain and wind in the British Autumn). In total 131 students agreed to participate in the research over a three hour time period and completed at least some of the pre-intervention questionnaire; 15 participants did not complete the trait anxiety inventory and we received 127 usable post-intervention questionnaires. Their demographic data are displayed in Table 1.

Table 2 shows the comparisons of the before and after state anxiety inventory, systolic and diastolic blood pressure. Paired samples t tests showed that on average there were significant reductions in systolic BP ($p < 0.05$), diastolic BP ($p < 0.001$) and state anxiety ($p < 0.001$) following attendance at the pet therapy session. Small effect sizes were recorded for differences in both systolic and diastolic BP and a large effect size was

recorded for differences in state anxiety. At the pre-intervention time period 24% of the students had clinical hypertension (systolic BP over 140 mmHg). At the post-intervention time point 20% of students had clinical hypertension (systolic BP over 140 mmHg).

The RCI for the state anxiety inventory (based on female norms due to the high level of females in our sample) is 8.76. Out of 127 students with before and after state anxiety inventory scores, 82 had a change of nine or higher indicating that the change was statistically reliable. Figure 1 provides a Jacobson plot displaying reliable change for the state anxiety inventory.

Table 1. The demographic data of the participants.

Total participants n	131
Age	
Range	18–35
Mean (SD)	19.92 (2.60)
Course	
Undergrad n (%)	121 (92.4)
Postgrad n (%)	10 (7.6)
Gender	
Male n (%)	35 (26.7)
Female n (%)	96 (73.3)
Nationality	
UK n (%)	97 (74.0)
EU n (%)	19 (14.5)
International n (%)	15 (11.5)
Pet ownership	
Pet at home n (%)	87 (66.4)
Pet at Uni n (%)	3 (2.3)
No pet n (%)	41 (31.3)

85% of participants were aged 18–21.

Clinical significance for the state anxiety inventory is a score that moves below 41 after the intervention. Sixty-one participants started with a score of below 41 and therefore any change would not be considered as moving from clinical to normative. Of the remaining 66 participants 56 moved from a score above 41 to one below 41 indicating that the change we saw was clinically significant, in those whose anxiety levels were high enough to be considered clinically relevant.

Discussion

Recruiting students to the study and retaining them to the end of data collection was very successful. More females and undergraduates attended than expected. When compared to the published data for female college students, the pet assisted therapy with students (PAwS) sample appears to be slightly more anxious both on the state and trait anxiety inventories. However, as this is a self-selecting sample who chose to attend a University Counselling Service for a relaxation session this is perhaps not unexpected.

The participants showed statistically significant reduction in systolic and diastolic blood pressure and in state anxiety, although only the state anxiety scale showed a large effect size.

Sixty-five percent of the participants showed statistically reliable change on the state anxiety inventory. Only 44% showed clinically significant change overall but almost half (48%) were below the cut off before they started and, therefore, considered within the normative distribution not the clinical distribution. Of the 52% whose pre-treatment score was within the clinical distribution, 85% showed clinically significant change.

This study has shown that even with a time limited intervention spending time with dogs can reduce both

Table 2. Paired t tests to compare means of the pre/post measures.

	Mean pre (SD)	Mean post (SD)	t test p value	Cohen's d	r
Systolic BP	131 (12.14)	129 (12.75)	0.035	0.16	0.08
Diastolic BP	80 (8.31)	78 (9.62)	0.001	0.22	0.11
State anxiety inventory	43.16 (10.56)	29.94 (9.94)	<0.001	1.29	0.54

Figure 1. A Jacobson plot showing the statistically reliable and clinically significant change for all the participants. The central dotted line shows no change, the dashed tramlines either side of the central line show statistical reliability. Any data point outside these lines is considered to be reliable change and not due to measurement error. As a lower score on the state anxiety inventory denotes less anxiety a data point below the central line is a participant whose anxiety decreased after spending time with the dogs.

Jacobson plot for the state anxiety inventory
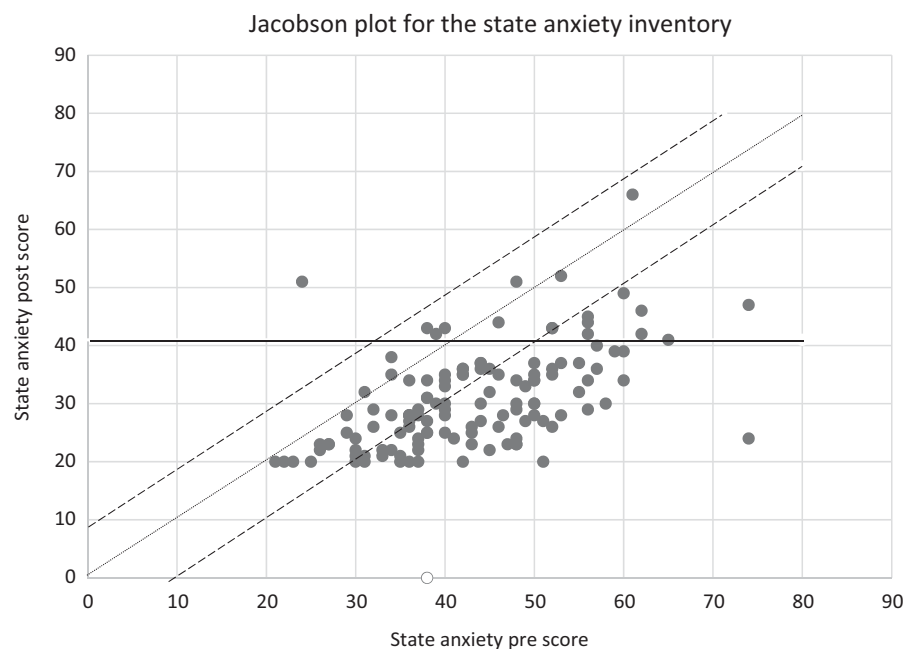
perceived stress (state anxiety inventory) and biological markers of stress (blood pressure) in University students. This is in line with other studies (Barker et al., 2005; Crossman et al., 2015) although Barker used a different bio-marker (cortisol) so it is not certain that they are measuring the same thing. A more recent study did not find any change in biomarkers, although it did in perceived stress (Barker et al., 2016). This study used different measures (STAI and blood pressure instead of the perceived stress scale and cortisol), however, the student populations were similar, stressed students with more females participating. The main difference between this study and Barker's trial however is the pragmatic nature of the intervention.

In our study the Counselling Service ran the pet therapy sessions as they have been for several years, Barker's intervention was new and appears to be a standalone event rather than a regular service, although still sponsored by the Counselling service. It also occurred just before an exam period when stress levels can be expected to be at an optimum. Our study occurred mid-semester when no major stressful events would be affecting all students.

As pet therapy sessions become more common, future research will need to ask participants about the number of previous pet therapy sessions they have attended as this may need to be controlled for. There is also a self-selection bias in this study and many others in pet therapy. A self-selecting set of students came to the pet therapy day and a self-selecting subset of them participated in the research. We did not collect any data on those who refused to participate, nor did we ask them to give a reason for refusing. For this reason, we cannot be sure that our sample is representative. The Experiences with Dogs questionnaire may also be important to include in further studies. We expect that most of the students who attended did so because they wanted to play with dogs. However, anecdotally, one of the students told the researcher collecting post intervention recordings that she was terrified of dogs and used the event as exposure therapy. She had not told anyone about this beforehand. This would have been a severely anxiety provoking situation and if we had a smaller sample size may have affected the results.

Earlier studies have suggested to get optimal readings from cortisol, the sample needs to be taken around 45 min after the intervention (Barker et al., 2005). We were able to take the blood pressure immediately post-intervention, allowing the students to leave quickly and reducing the burden of the research. However, the use of cortisol as a more direct measure of stress is recognised. In this study, due to time and financial considerations, we were unable to include cortisol testing. Further studies may benefit from both blood pressure and cortisol measures. Randomised controlled trials with large sample sizes like we managed to achieve here preferably with nested qualitative research may be helpful to determine who can get the most benefit and what sort of animals or breeds of dog may be most helpful. Controlled studies comparing pet therapy to other relaxation sessions such as mindful colouring or meditation would also be helpful.

Applied research is a complicated task due to the number of stakeholders involved. This study was no exception. The charity, Guide Dogs for the Blind provided the dogs and handlers for the event. Although they knew the research was going to occur, they were not sufficiently briefed on the details. This made relationships on the day difficult. Staff were present from Guide Dogs, the research department and the Counselling Service, at times it was very crowded in a small building.

Conclusions

Recruiting students at the pet therapy day was successful. Despite the short intervention, statistically significant changes in state anxiety and blood pressure were seen including a very large uncontrolled effect size on the state anxiety inventory. In many studies, it is difficult to tell whether the participants got 1:2:1 time with the animals or if they were part of a group. This study had groups of six students spending 15 min with two dogs. This was a very short group-based intervention, but still showed significant results, this may be a very cost effective way to deliver stress management to study groups. Further controlled research into cost effectiveness is required.

Declaration of interest

No potential conflict of interest was reported by the authors.

Ethics statement

Ethical approval for the project was granted by the School of Health and Related Research (ScHARR) research ethics committee on behalf of the University of Sheffield. Informed consent was sought from all the participants.

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