Case Study 1: An Evidence-Based Practice Review Report

Theme: Interventions implemented by parents.

Does having a pet dog effectively reduce children and young people's levels of stress or anxiety? A systematic review of the literature.

1. Summary

With NHS Digital (2021) reporting that one in six 5 to 16-year olds have a probable mental health disorder it demonstrates the significant need for professionals and families to find alternative ways to reduce mental health difficulties arising in children and young people (CYP). This systematic literature review explored if having a pet dog is effective at reducing CYP's levels of stress or anxiety. Four databases were searched including Medline, PsycINFO, ERIC and Web of Science and 6 papers were selected for full review. Gough's (2007) Weight of Evidence (WoE) Framework was used to assess the quality and relevance of the studies, together with Gersten et al.'s (2005) and Joanna Briggs Institute's (JBI) (2017) coding protocols. The findings displayed a range of small to large effect sizes, with some also reporting no effects. Although generally the studies indicated a promising reduction in levels of self-reported anxiety symptoms, or biological measures of cortisol levels, there were many weaknesses in the methodology which have been reflected in the in-depth WoE review. Therefore, the evidence should be considered very carefully, and the limitations of the studies and suggested improvements for future research have been deliberated.

provide just as much love, protection and companionship as a human relative (Archer, 1997).

Within the literature, an AAD and a service dog seem to be used interchangeably, with the dogs receiving similar training to support CYP with Autism, which two studies in this review include. Typically, the dog receives training to support children with Autism who are at risk of fleeing in public. This occurs by working as a triad, whereby the child is connected via a belt to the dog's vest and the caregiver holds the leash. Additionally, they can be trained to follow commands, remain calm in chaotic environments to aim to improve CYP's social behaviours and perform tasks to increase CYP's independence. The dog is carefully matched to the individual CYP's temperament before being provided to the family, but this is often at a high cost and can involve being on a waiting list for up to five years (Viau et al., 2010; Tseng, 2022). A review by Sprod and Norwood (2017) reported that through participating in AAD programmes CYP's safety and social communication skills can be enhanced which, in turn can increase parental confidence and reduce parenting stress.

2.3 Psychological Theory

Attachment theory (Bowlby, 1988) has been suggested as a convincing psychological basis underpinning the relationship between dogs and changes in CYP's wellbeing. This theory has been applied to many other mammalian species and therefore has been proposed that attachm04 Tw 10 (n pr)(h)-6be primary caregiver(s)

Table 2: Inclusion and Exclusion criteria

	Inclusion	Exclusion	Rationale(s)
1. Study design	Experimental design Cross sectional studies Cohort studies Studies don't involve a stressor task Comparison group doesn't own a dog	Qualitative data Systematic reviews Studies involve a stressor task Comparison group owns a dog	Due to the nature of this research question not being as feasible or ethical to manipulate variables, study design criterion was less strict, as long as it included quantitative data to discover potential correlations. Reviews of secondary data were excluded due to requiring original empirical research. This review was interested in longer term impacts of stress or anxiety, rather than short term impacts during experimental tasks
2. Settings	Involves the animal living at the home environment	Unfamiliar dog in any other setting outside of the home e.g. lab, school, hospital, dentist etc.	This review aims to look at natural, real-life settings and something parents/carers can more easily put in place to support their children.
3. Participants	0-17 years of any demographic No or any diagnosis	Adults	This review aims to explore potential benefits of any CYP for EPs to possibly advise parents/carers.

Figure 1: Diagram of screening selection process in accordance with PRISMA statement recommendations (Page et al., 2021)

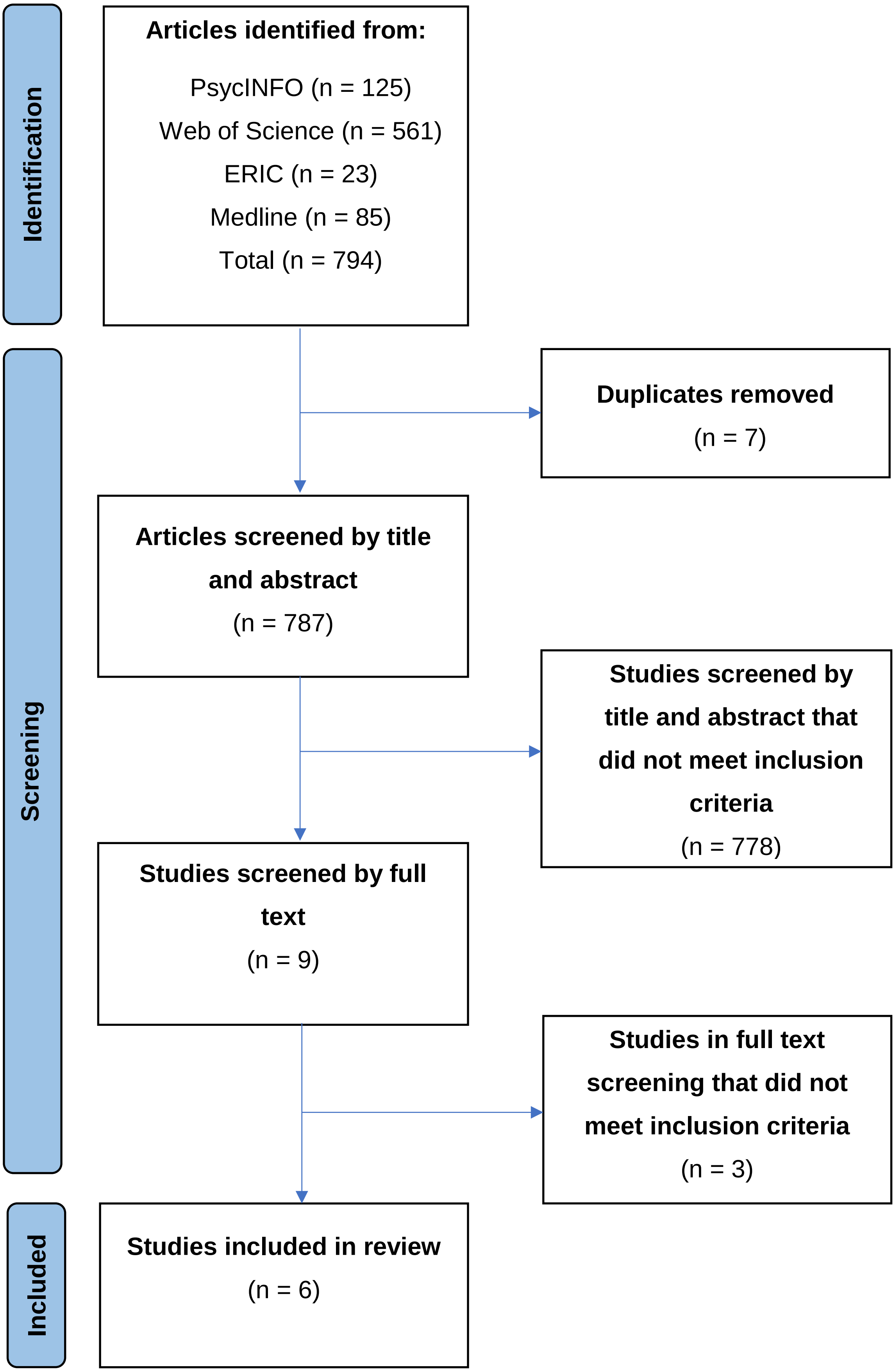

Table 3: List of included studies

	Full references of included studies
1	Aggarwal, S., Aggarwal, R., Sodhi, M. K., & Aggarwal, S. (2022). Psycho-Social Effects of Pet Dog Ownership on Mentally Challenged Children. Cureus Journal of Medical Science, 14(6), e26389. https://doi.org/10.7759/cureus.26389.
2	Gadomski, A., Scribani, M.B., Krupa, N., Jenkins, P., Nagykaldi, Z., & Olson, A.L. (2015) Pet Dogs and Children's Health: Opportunities for Chronic Disease Prevention? Preventing Chronic Disease, 12, e205. https://doi.org/10.5888/pcd12.150204.
3f1	

3.31 Participants

A total of 969 participants took part in relevant anxiety or stress related measures in the studies. They ranged from 5-11 participants in the smallest study (Tseng, 2022) to 643 in the largest (Gadomski et al., 2015). As part of the inclusion criteria, all ages were included until CYP legally became an adult. Three studies included primary age children (Aggarwal et al., 2022; Gadomski et al., 2015; Tseng, 2022), one included secondary age children (Kerensh9 (ensh9)10 (al)6 disability (Aggarwal et al., 2022), and in the two other studies participants being mostly from one ethnicity or all attending the exact same GP clinic (Gadomski et al., 2015; Gadomski et al., 2022). The other three studies scored a rating of 1 due to having very homogenous samples including all participants having a diagnosis of Autism and having many more male than female participants (Tseng, 2022; Viau et al., 2010; Wright et al., 2015). Furthermore, two of the studies did not include a breakdown of participant demographics for the sub-population who completed the relevant stress or anxiety measures following large attrition rates, making it even more difficult to judge how representative their samples were and this was reflected in their low WoE A scores (Tseng 2022; Viau et al., 2010).

3.32 Study design

None of the studies scored the highest rating of 3 for WoE B due to not involving lon ,lme sr

Two studies did not include control group (Tseng, 2022; Viau, 2010) to compare levels of cortisol in participants without a dog. Instead they measured levels within-subjects after introducing a dog, which may have naturally reduced for other unknown reasons and so effect sizes need to be considered with extra caution. Furthermore, some studies included an additional time point, follow up measure or were longitudinal in nature (Viau et al., 2010; Wright et al., 2015; Gadomski et al., 2022) so could be said to be of better h,in6J 0 Tc 0 Tw 2.

et al., 2022) which were rated lower on WoE C criteria due to these dogs being much less accessible and affordable for most caregivers. Three studies looked at additional factors regarding dog ownership which were reflected in higher WoE C scores due to potentially providing more useful information for future research regarding any underlying mediations of the observed relationship. For example, Aggarwal et al. (2022) reported decreases in anxiety symptoms were comparable across different breeds of dogs, Gadomski et al. (2015) stated the amount of years with a dog didn't affect anxiety scores and Gadomski et al. (2022) found that despite there not being a correlation between owning a dog or exposure length, there was a correlation between being highly attached to the dog, with a reduced risk of an anxiety diagnosis. A flaw of four studies was measuring fidelity, which indeed is harder to measure with a pet dog which isn't an intervention with set guidelines per se.

,a (a)10- (l)6 -4.

for example, reflected in higher WoE C ratings. Three of the studies only relied on parent or self-report measures of symptoms and thus may have been increasingly subject to limitations such as social desirability bias, as opposed with two studies which included a more objective, biological measure of cortisol (Tseng, 2022; Viau et al. 2010). However, both of these studies had considerably small sample sizes dues to difficulty in cortisol sample collection, as well as no control group so results should be particularly scrutinised. Only one study stated the reliability of the outcome measures (Tseng, 2022) and no studies had blind scorers to the study conditions which could have reduced potential researcher bias and is reflected in lower WoE A ratings.

3.35 Findings and effect d in l.004 Twh0 -2.46 .004 u4.004 Tc 0.e08n le3.allengy sOa w

1988). The results of one study's (Gadomski et al. 2022) outcome measure, which measured if young people developed an anxiety disorder after an 8 year follow up, was not able to be converted into an effect size due to using a proportional hazards regression model.

Effect sizes in all other relevant stress and/or anxiety measures in the included five studies mostly ranged from small to large (using Cohen's 1988 descriptors) suggesting a negative correlation between owning a pet dog and measures of anxiety or stress, with a few however reporting no significant effects. A summary of all six studies outcome measures, key findings and effect sizes are displayed in table 5.

Table 5: Effect Sizes and Descriptors

Study	Measure of stress/anxiety	Number of participants (CYP)	Key reported findings	Cohen's d effect size (and *p*-values)	Descriptor of effect size[3]	WoE D
Aggarwal et al. (2022)	Hamilton Anxiety Scale (HAM-A)	**Total:** 92 **Dog group:** 52 **Control:** 40	The HAM-A score was significantly lower for the dog owning group compared to the control group after 3-6 months.	**HAM-A mean score**: 0.72 (p-value <0.001)	Medium - Large	1.6
Gadomski et al. (2015)	The (he)-</MCID 83 5h044 0.48 148 124.2 reD 77 BDC q-0.7 eiyo					

[3] Cohen's d (1988) effect size descriptors - .2 = small, .5 = medium, .8 = large

Study	Measure of stress/anxiety	No of participants (CYP)	Key reported findings	Effect size (Cohen's d)	Descriptor of effect size	WoE D
Gadomski et al. (2022)	The Screen for Child Anxiety Related Emotional Disorders (SCARED-41) Diagnosis of Anxiety within 8 year follow up	**Total:** 241 **Dog group:** 152 **Control:** 89	No correlation between cumulative dog exposure and SCARED-41 scores. Having a pet dog was not associated with lower risk of an anxiety diagnosis. Cumulative exposure to the most highly attached dog was associated with a reduced probability of an anxiety diagnosis.	**SCARED-41 total score:** 0.12 (p= .40) **Anxiety diagnosis** Not computed (p = .006)	No effect N/A	2.6
Tseng (2022)	Child behaviour checklist (CBCL – anxious subscale) Chronic Cortisol Concentrations (CCC)	**CBCL:** 11 **CCC:** 5 Within-subjects design No control	There were significant pre-post AAD improvements for children on the CBCL (anxious subscale) and a reduction of the objecph Tc 74.68 Tm( )7 (e)			

However, from this review it can be seen that effect sizes were also shown for CYP without Autism, and also not just for trained dogs highlighting perhaps it is presence of the dog itself, and not the training which may help reduce levels of stress and anxiety.

The generally poor WoE A ratings for the studies in this review, highlight the need for improved methodological rigour in future studies. RCT's are understandably not very feasible nor ethical with this type of research, but studies should aim to have a non-dog owning control group, an additional time point or follow up measure, use a combination of stated valid and reliable self-report and biological measures and engage in increased fidelity monitoring. This may include observing, recording or interviewing caregivers on the CYP's interaction with the dog and providing stricter instructions to carers how to effectively collect cortisol levels to ensure data is not lost, reducing sample sizes. Studies should also aim to measure factors within CYP that may be underlying the relationship between dogs and mental health such as amount of exercise and social interaction through dog walking, if the dog seems to help improve CYP's sleep and their levels of interaction e.g. through playing fetch, stroking or grooming.

In conclusion, due to the methodological flaws of most of the included studies and being unable to rule out a myriad of confounding variables, EPs should not confidently recommend acquiring a dog to caregivers who may be considering this to improve their child's mental health but findings do indeed look promising.

5. References

Aggarwal, S., Aggarwal, R., Sodhi, M. K., & Aggarwal, S. (2022). Psycho-Social Effects of Pet Dog Ownership on Mentally Challenged Children. Cureus Journal of Medical Science, 14(6):

McNicholas, J., & Collis, G.M. (2001). Children's Representations of Pets in Their Social Networks. Child: Care, Health and Development 27(3): 279–94. https://doi.org/10.1046/j.1365-2214.2001.00202.x.

Meehan, M., Massavelli, B., & Pachana, N. (2017). Using attachment theory and social support theory to examine and measure pets as sources of social support and attachment figures. Anthrozoös, 30(2): 273–289. https://doi.org/10.1080/08927936.2017.1311050

Moola, S., Munn, Z., Tufanaru, C., Aromataris, E., Sears, K., Sfetcu, R., Currie, M., Qureshi, R., Mattis, P., Lisy, K., & Mu, P-F. (2017) Chapter 7: Systematic reviews of etiology and risk. Joanna Briggs Institute Reviewer's Manual. Adelaide.https://jbi.global/sites/default/files/202007/Checklist_for_Analytical_Cross_Sectional_Studies.pdf

Nimbva5sg 8g -(g)3 -(g)20 ate, 6r..kle6 (.)ar(,)1 (_S)hle0 (w),.tnacoorle0 (w):4 (k)4 (.)0.0012 T their Families. Journal of Autism and Developmental Disorders, 53(1): 468-483.

6. Appendices

Appendix A: Excluded studies and rationales

Table 1: List of excluded studies after full review

Full References of excluded studies	Exclusion criteria number
Carlisle, G.K., Johnson, R.A., Wang, Z., Bibbo, J., Cheak-Zamora, N., & Lyons, L.A (2021). Exploratory Study of Cat Adoption in Families of Children with Autism: Impact on Children's Social Skills and Anxiety. Journal of Pediatric Nursing, 58, 28-35. https://doi.org/10.1016/j.pedn.2020.11.011.	4 The study involves only cats and no dogs
Kertes, D.A., Liu, L., Hall, N., Hadad, N.A, Wynne, C.D.L., & Bhatt, S.S. (2017). Effect of Pet Dogs on Children's Perceived Stress and Cortisol Stress Response. Social Development, 26(2), 382–401. https://doi.org/10.1111/sode.12203.	4 The study involves completing a social stress test and the comparison group owned a dog. .
Kerns, K.A., Stuart-Parrigon, K.L, Coifman, K.G., van Dulmen, M.H.M., & Koehn, A. (2018). Pet Dogs: Does their presence influence preadolescents' emotional responses to a social stressor? Social Development, 27(1), 34-44. https://doi.org/10.1111/sode.12246.	4 The study involves completing a social stress test and the comparison group owned a dog.

Appendix B: Mapping the Field

Author & location	Study design	Participant numbers (CYP)	Participant demographics	Intervention type	WoE C criteria and score
Aggarwal et al. (2022) India	Quasi-experimental Pre and Post design (AB) Between				

Author & location	Study design	Participant numbers (CYP)	Participant demographics	Intervention type	WoE C criteria and sc0erpoTf-0.(

Appendix C: Coding Protocol amendments

Appendix D: Weight of Evidence (WoE) A: Methodological quality for quasi-experimental designs using Gersten et al.'s (2005) coding protocol

Critical appraisal checklist reference:

Gersten, R., Fuchs, L. S., Compton, D., Coyne, M., Greenwood, C, & Innocenti, M. (2005). Quality indicators for group experimental and quasi-experimental research in special education. Exceptional Children, 71, 149-164.[4]

Study Reference:

Wright, H., Hall, S., Hames, A. Hardiman, J., Mills, R., PAWS Project Team & Mills, D. (2015). Pet Dogs Improve Family Functioning and Reduce Anxiety in Children with Autism Spectrum Disorder. Anthrozoos, 28(4),611–24.

Table 4: Scoring for WoE A, based on Gersten's et al. (2005) guidelines

	High Quality	**Acceptable Quality**
Wright et al. (2015)	(Needs to meet all but one of the essential quality Indicators and at least 4 desirable)	(Needs to meet all but one of the Essential Quality Indicators and at least 1 desirable)
	Rating = 3	

Rationale: Fidelity is indeed harder to measure with this type of study but no observations were completed of the child with the pet, no measures of attachment were completed, no parent views were gained about their child's interactions with the dog, no details were provided if outcome measures were gathered effectively and reliably, and no

5. Were confounding factors identified?	☐	☐	☐	☐

Rationale

Appendix F: Weight of Evidence (WoE) A ratings for methodological quality

Table 1: Summary of WoE A ratings based on the Gersten (2005) and JBI (2017) coding protocols

Study	Essential indicators	Desirable indicators	Overall WoE A

Criteria