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A systematic review

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**The association between companion animal attachment and depression: A
systematic review**

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Abstract

There is significant literature related to companion animal attachment and depression, but to date, no systematic review has synthesized this literature. The aims of this systematic review are threefold: (1) to compare depression outcomes between pet and non-pet owners; (2) to identify the prevalence of how attachment is operationalized within the human-pet relationships literature, as it is defined in two distinct, divergent ways: as an attachment bond, or as attachment orientations; and (3) to review and synthesize the existing literature related to the association between pet attachment and depression. A search of five databases (Pubmed, Medline, Web of Science, Embase, and PsycInfo) was conducted in January 2024 to locate articles (journal articles, dissertations) focusing on pets, attachment, and depression or depressive symptoms which met predefined inclusion and exclusion criteria. In total, 40 studies were included in the review. Eighteen studies compared depression outcomes in pet owners and non-pet owners and of these, with 14 finding no significant difference in depression between the two groups, and four finding that pet owners were significantly less depressed than non-pet owners. The majority of studies measuring attachment bond point to a positive or non-significant relationship with depression, while the majority of studies measuring attachment orientation indicate that higher levels of secure attachment are negatively associated with depression, while higher levels of attachment insecurity are typically positively associated with depression. We conclude that the field needs more clarification regarding the definition of attachment so that meaningful conclusions regarding the impact of pet attachment on mental health can be drawn.

Keywords: attachment, pets, companion animals, human-animal interaction, depression, systematic review

Introduction

Depression is a prevalent mental health concern, with about 5% of adults suffering at any given time (World Health Organization [WHO], 2023). Increasing evidence demonstrates that ownership of companion animals, hereby referred to as “pets”, may be beneficial for mental health (Cleary et al., 2021; Hui Gan et al., 2020) specifically for depression, through increasing hedonic mood, behavioural activation, reduction of negative feelings, increased social support, and the prevention of self-harm and suicide ideation (Barcelos et al., 2023; Hawkins et al., 2021). In addition to their efficacy, pets are available; more than half of households worldwide have a pet, and pet ownership is increasing (Health for Animals, 2022). Many pet owners report that their pet plays a supportive role in their lives (Bradshaw, 2017; Headey, 1999), suggesting that pets could be an important resource for the self-management of depressive symptoms. However, research findings on the link between pet ownership and mental well-being have been inconsistent (Herzog, 2011), with some past research indicating positive mental well-being outcomes (Cheung & Kam, 2018; Gonzatti et al., 2021; Grajfoner et al., 2021; Janssens et al., 2020), and others indicating neutral (Bolstad et al., 2021; Gilbey & Tani, 2015), or even negative mental well-being outcomes (Fraser et al., 2020; Mueller, et al., 2021; Peacock et al., 2012). At present, we do not have a clear picture of whether pets improve well-being or the factors that might explain variability in prior research.

This systematic review focuses specifically on depression and its association with pet attachment in order to provide a detailed review on this serious mental health concern in relation to this important aspect of relationships. Other reviews have focused on pets and

quality of life or mental health in a more general sense (Brooks et al., 2021; Hughes et al., 2020; Islam & Towell, 2013; Purewal et al., 2017; Scoresby et al., 2021), on pet ownership and loneliness (Gilbey & Tani, 2015; Kretzler et al., 2022), or on animal-assisted therapy and mental well-being (Acquadro Maran et al., 2022; Cherniack & Cherniack, 2014). Therefore, this review will provide a new perspective on the association between depression and pet attachment.

Pets and well-being

The link between pet ownership and well-being has been extensively researched. Based largely on cross-sectional and correlational designs, some studies have indicated that pet ownership is related to less anxiety (Bolstad et al., 2021; Giansanti et al., 2022; Gonzatti et al., 2021), depression (Chakma et al., 2021; Lem et al., 2016), and overall improved mental health (Cleary et al., 2021; Hui Gan et al., 2020). However, other studies report neutral or negative well-being outcomes of pet ownership. Some studies report no impact or a very small effect on mental health (Bolstad et al., 2021; Martin et al., 2021; Martins, 2023), while other studies report that pet owners experience more negative mental health symptoms (Denis-Robichaud et al., 2022), especially in times of extreme stress (Phillipou et al., 2021), when the pet is sick or dying (Nakano et al., 2019), or when pet owners cannot be present with their pet as much as they feel that they should be (Kogan et al., 2022). In short, prior work indicates that pets may help, hinder, or be unrelated to our well-being.

Pets, attachment, and well-being

Due to the inconsistency in results on the impact of pet ownership on well-being, and in particular depression, it is important to uncover the variables that may be creating these differences in results. One possibility is that it is not the existence of the pet but rather the nature of the relationship between pet and owner that predicts the well-being outcomes. There are several relationship dynamics that may impact the quality of the human-animal relationship. One such relational dynamic is attachment (Bowlby, 1969). Attachment theory posits that attachment security reflects the belief that others will respond reliably to one's needs; attachment anxiety reflects the fear that others will not be reliably available and loving; and attachment avoidance reflects wariness related to others' intentions, and subsequent emotional distance (Mikulincer & Shaver, 2019).

The concept of attachment orientations as individual differences in attachment anxiety and attachment avoidance has been primarily studied in human-human relationships, such as parent-child relationships, friendships, and romantic relationships (Hazan & Shaver, 1987; Zimmerman & Katon, 2005). Within human-human relationships, the link between attachment and well-being has been studied with several different age groups, including adolescence (Mónaco et al., 2019), early adulthood (Kafetsios & Sideridis, 2006), and older adulthood (Cicirelli, 1989; Kafetsios & Sideridis, 2006; Webster, 1997), with each of these studies finding the same result: secure attachment (i.e., lower attachment anxiety and attachment avoidance) is linked to better well-being (Kafetsios & Sideridis, 2006; Karreman & Vingerhoets, 2012; Mikulincer & Shaver, 2019). Such attachment orientations may also be relevant within human-pet relationships, yet significantly less

research has explored attachment orientations within these relationships (Zilcha-Mano et al., 2011).

One notable challenge related to the study of attachment within human-animal relationships is that there seems to be two major definitions for the construct. One is to define attachment as it relates to Bowlby's (1969) attachment theory as discussed above, while the second is to define attachment as closeness or bondedness. For example, one of the most widely utilized tools to measure attachment within the human-pet relationship is the Lexington Attachment to Pets Scale (LAPS; Johnson et al., 1992), which measures attachment bond. In contrast, another widely utilized scale is the Pet Attachment Questionnaire (PAQ; Zilcha-Mano et al., 2011), which measures attachment orientations. Variability in the definition of attachment poses challenges for the field in the discussion and synthesis of literature on this subject. For the purpose of this systematic review, both types of measurement will be included, and themes of the results of these two different operationalizations of pet attachment will be discussed.

Present study

The present study sought to review existing literature related to attachment to pets and depression in order to synthesize past research and provide clarity related to the association between pet attachment and depression. There are currently no systematic reviews on these specific topics as they relate to one another and therefore this review could provide new insight to the field. Additionally, this review seeks to explore the ways in which attachment is defined in this field of research. This systematic review will seek

to answer the following research questions: 1) Do pet owners and non-pet owners differ in their levels of depression?; 2) How is attachment operationalized within the field of human-companion research?; and 3) Is there a link between attachment to pets and depression?

Methods

This systematic review process involved a search of multiple databases and references to identify papers that meet criteria for inclusion, an initial title and abstract screening (completed by the primary author), a more in-depth full-article review (completed by the primary author and a research assistant), data extraction and quality assessment (completed by the primary author and a research assistant), and analysis (completed by the primary author). Figure 1 illustrates this process, using the PRISMA Statement flow diagram (Page et al., 2021). No ethical approval was required for this project, as the systematic review included only publicly available past research.

Eligibility criteria

See Table 1 for a list of inclusion and exclusion criteria. Both published studies and unpublished dissertations were included in order to address concerns related to publication bias (Korevaar et al., 2020). Furthermore, 1983-2024 was included as the date range in order to constrict results to more recent and relevant studies; we chose this range to encompass all modern work.

Search strategies, sources, and selection

Literature searches were conducted in January 2024 of the databases Pubmed, Medline, Web of Science, Embase, and PsycInfo. We employed the following search terms: (pet OR pets OR “companion animal” OR “communal pet” OR “family pet” OR cat OR cats OR dog OR dogs OR animal OR animals OR canine OR canines OR feline OR felines OR human-animal relationship* OR “pet ownership” OR “animal ownership” OR “animal companionship”) AND (depress* OR mood OR "mood disorder" OR affective) AND (attachment OR bond OR bonded OR bondedness. A total of 9,301 articles were identified during this initial search. References of included studies, as well as authors’ personal knowledge related to appropriate studies, were also reviewed, resulting in the inclusion of an additional 26 records. Therefore, the total number of articles generated by the search strategy was 9,327. Prior to title and abstract screening, 1,693 duplicate articles were removed. At the title and abstract screening stage, 7,576 articles were screened out as being irrelevant to the current systematic review. During the full text review, 19 articles were excluded, with 18 being eliminated for not measuring depression as an outcome, and 1 being eliminated for being the incorrect study design for this review. The final number of studies included in this review is 40 (see Figure 1).

Data extraction and results synthesis

To conduct this review, the reference manager software Zotero was used to initially organize records and remove duplicates. These records were then imported to the systematic review management software Covidence, which was used for the title and

abstract screening, full article review, data extraction, and quality assessment processes. Information outlined in Table 2 was extracted.

Quality assessment

The Quality Assessment Index utilized in our review was created based on a quality assessment developed for a previous systematic review involving pet ownership and well-being, and a quality assessment tool developed by NIH (National Heart, Lung, and Blood Institute [NHLBI], 2013; Scoresby et al., 2021). The Quality Assessment Index is scored with each item being rated as 1 or 0. The maximum score for the Quality Assessment Index is 12, with higher scores indicating better study quality.

Results

Our search strategy returned 9,327 total results. Ultimately, 40 of the 9,327 articles identified in the initial search strategy were included after being screened based on inclusion and exclusion criteria. Study characteristics, including population, design, and measures of the 40 included studies are included in Table 3.

Population

For this review, “pet owners” were defined as individuals currently living with their pets. “Pet” was defined as any species of animal living in the home, excluding service animals. Pet ownership can be defined with significant variation across existing literature, including those currently not living with pets, or those with service animals, and we

believed that having a level of homogeneity related to pet ownership would improve the quality of this systematic review.

Across these studies a total of 22,449 participants were included, of which 17,043 (76%) were pet owners, 4,115 (18%) were non-pet owners, and 1,291 (6%) were not identified as belonging to either group. Of the pet owners, 6,217 (36%) were cat owners, 9,840 (58%) were dog owners, 1,296 (8%) owned another type of pet, and 1,941 (11%) did not identify the type of pet they had in their home. Some studies allowed for participants to select multiple pets.

Studies included a wide variety of populations. Some studies concentrated on specific age groups with nine focusing on older adults, one focusing on children, one focusing on young adults ages 18-21, and one focusing on university students. All other studies (n=28) included minimal restrictions related to age. Five studies focused specifically on women and one study focused only on men, while all others (n=34) had both male and female participants. Some studies also focused on other specific populations: six focused on adults with chronic mental health or physical health concerns, two focused on LGBTQ+ adults, two focused on veterans, one focused on caregivers of individuals with Alzheimer's, and one focused on Mexicans and Mexican Americans.

Design

The majority (n= 33) of the studies included in this review had cross-sectional designs, five were cohort studies, one was a non-randomized experimental study, and one was a

retrospective cohort study. Twenty of the 40 studies included non-pet owners. Full details can be found in Table 3.

Measures

The most common attachment scale by far was the Lexington Attachment to Pets Scale (LAPS; Johnson et al., 1992), which was used in fifteen of the studies included in this review. The second most common scale was the Companion Animal Bonding Scale (CABS; Poresky et al., 1987), which was used in four studies. A single Likert-scale question regarding attachment (Branson et al., 2016; Branson et al., 2017), the Pet Attachment Scale (Albert & Bulcroft, 1988), and the Comfort from Companion Animals Scale (Zasloff, 1996) were each used in two studies. No other attachment scale was used in more than one study included in this review. The most common scale used for measuring depressive symptoms was the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), which was used in ten of the studies included in the review. The Beck Depression Inventory (BDI; Beck et al., 1996) and the Geriatric Depression Scale (GDS; Yesavage et al., 1983) were both also used commonly, with each being used in five of the studies included in this review.

Individual study results

Individual study results are included in Table 4. Significance in all studies was defined as $p \leq 0.05$.

Quality assessment

The Quality Assessment Index, which was adapted from a quality assessment developed for a previous systematic review involving pet ownership and well-being, and a quality assessment tool developed by NIH (NHLBI, 2013; Scoresby et al., 2021), rated studies on 12 criteria. Six studies received a score of 11 (15%), twelve studies received a score of 10 (30%), twelve studies received a score of 9 (30%), nine studies received a score of 8 (22%), and one study received a score of 7 (3%). Results of the quality assessment can be seen in Table 5.

All studies clearly stated their aims, their populations, inclusion/exclusion criteria, recruitment method, and independent/dependent variables. All of but two of the studies reported sample demographics. Interestingly, eleven studies did not discuss the validity or reliability of their measures, while twelve studies lacked a designated limitations section. Twenty-five studies did not include a statement addressing author bias or conflict of interest. Twenty of the studies (50%) included a comparison group (non-pet owners). The presence of a comparison group was of particular interest, as it allows an overall comparison of depression outcomes between pet owners and non-pet owners. Also of specific interest in the quality assessment was the presence of an *a priori* power analysis, and whether sample size was adequate. Only eight studies included an *a priori* power analysis, and eight studies had insufficient sample sizes.

Synthesis of Included Studies

This systematic review sought to answer the following research questions: 1) Do pet owners and non-pet owners differ in their levels of depression?; 2) How is attachment

operationalized within the field of human-companion research?; and 3) Is there an association between attachment to pets and depression? This section will provide a synthesis of study results in regard to these research questions, as well as additional synthesis of results regarding interaction between attachment bond and attachment orientations, specific populations, and pet types; as well as a comparison of unpublished versus published works.

Pet owners versus non-pet owners

Of the 40 studies included in this review, 20 included non-pet owners, and 18 evaluated differences in depression levels or depressive symptoms between pet owners and non-pet owners. Fourteen of these found that there was no significant difference in depression levels or depressive symptoms between the two groups, four found that pet owners had lower levels of depression or fewer depressive symptoms than non-pet owners, and no studies found that pet owners had higher levels of depression or more depressive symptoms than non-pet owners.

Operationalizations of attachment

Attachment in the context of human-pet relationships has been studied related to two differing operationalizations of attachment: attachment bond, and attachment orientations. Of the 40 studies included in this review, 33 of the studies explored attachment bond only, five explored attachment in terms of both attachment orientations and attachment bond, and two explored attachment orientations alone.

Interaction between attachment and depression

Attachment bond

A total of 38 studies included attachment bond as a measure. For this review, studies measuring attachment bond have been sorted into five main outcomes regarding the association between attachment and depression: a positive association; a negative association; no significant association; an unanalyzed association; or an inconsistent association, where the association was influenced by either an additional variable or by symptomatology grouping during analysis. Studies that displayed a significant positive or negative association between attachment and depression in one population segment and a non-significant association within other population segments are classified as either having a positive or negative association between attachment and depression, rather than a non-significant or inconsistent association. However, the non-significant data is still reported in the table of results. Studies focusing on attachment orientations will be discussed separately. Overall, there were more studies finding either no significant link or a positive link between the two variables, than any other outcome. These results are reported in Table 6.

Attachment orientations

There were seven studies that included attachment orientations as a measure.

Complicating the synthesis of these results is the issue that five of these studies employed a dimensional approach to attachment, while two utilized a categorical approach.

Dimensional representation of attachment is generally considered to be preferable, with two features being measured: attachment anxiety and attachment avoidance. Dimensional

measurement yields more precise and consistent results regarding individual differences and therefore is the preferred operationalization (Fraley, 2015). Despite the use of a categorical approach by two of the studies, synthesized results overall indicate that higher levels of attachment anxiety and, to a lesser extent, higher levels of attachment avoidance, are more often associated with higher levels of depression. These results are reported in Table 7.

Interaction between attachment bond and attachment orientations

Of the seven studies that included attachment orientations as a measure, five of these studies explored the link between attachment orientations and attachment bond. One study found a positive link between attachment avoidance and attachment bond (Burnett, 2009). Another found no significant link between either attachment anxiety or attachment avoidance and attachment bond (Quinn, 2005). Two studies found that attachment anxiety correlates positively with attachment bond, and that attachment avoidance correlates negatively with attachment bond (Reevy & Delgado, 2020; Teo & Thomas, 2019). Lastly, one study found that fearful attachment characteristics are related to the highest levels of attachment bond, followed by attachment security, then by attachment avoidance, and lastly by attachment anxiety (Taggart, 1996).

Interaction between attachment and depression in specific populations

There were specific population inclusion criteria for several of the studies based on age, gender, sexual orientation, ethnicity, health status, and veteran status. Of the nine studies that focused on older adults, five found a positive association between attachment and

depression, which was a larger percentage of studies than in the overall systematic review (55.6% versus 31.6%). Of the five studies focusing only on women, two studies found a positive association between attachment and depression, two found no significant association between the two variables, and one did not analyze the association between the two variables. These results largely align with the overall results within the systematic review. Although there were other studies that focused on specific populations such as children, LGBTQ+ adults, caregivers, Mexicans and Mexican Americans, veterans, individuals with mental health concerns, and individuals with chronic physical health concerns, there were too few studies related to each to make meaningful comparisons across the findings.

Pet types

Thirty-three of the studies included in this review focused on multiple animals (typically dogs and cats) or did not specify what type of animal participants owned. Five of the studies focused specifically on dog owners, while only two focused on cat owners. Of the five studies that focused on dog owners, four did not analyze the association between depression and attachment, and one found a positive association. Both studies that focused only on cat owners found no significant association between depression and attachment.

Unpublished and published works

There were 33 peer reviewed articles, and seven unpublished manuscripts included in this review. The unpublished manuscripts overall focused more heavily on attachment

orientations, with three (42.9%) of the studies including measures of attachment orientations. All seven of the unpublished manuscripts also included measures of attachment bond, with three of the studies finding no significant association between attachment bond and depression, two of the studies finding a positive association between the two variables, one finding a negative association, and one not analyzing the association. These results are consistent with the findings of the overall review. Notably, the average quality score for the seven unpublished manuscripts was 9.6, while the overall average quality score was 9.3, indicating that the unpublished manuscripts' quality were of a similarly high value as the peer reviewed articles' quality.

Discussion

This systematic review sought to review and synthesize the existing literature linking pet ownership and depression. Specifically, we focused on the role of attachment within this relationship as a factor that might help explain the variability in findings in this domain. Further, we aimed to review the ways in which researchers have conceptualized pet attachment, and to explore differences in depression levels for pet owners and non-pet owners.

Themes

There are three overarching themes related to our research questions that emerged through this systematic review, outlined below.

Pet owners versus non-pet owners

The first theme that emerged indicates that, in most (78%) of the literature included in this systematic review, there is not a significant difference between pet owners and non-pet owners in levels of depression. However, four studies (22%) indicated that pet owners had lower levels of depression, perhaps providing modest support for popular beliefs regarding the “pet effect” (Allen, 2003).

Operationalizations of attachment

Secondly, attachment bond was the most common operationalization of attachment, rather than attachment orientations. As discussed previously, 38 of the 40 included studies (95%) measured attachment bond, whereas only 7 of the 40 studies (18%) measured attachment orientations. Moreover, most pet attachment measures tap into the total strength of emotional bond, rather than by attachment orientations which are attachment theory-driven. Given the findings from both human-human and human-pet attachment studies, attachment orientations (such as anxious or avoidant compared to secure) have important implications for mental health and so are important to consider in future studies.

Interaction between attachment and depression

Third, we sought to assess whether attachment could explain the inconsistent findings in past studies related to the association between pets and well-being outcomes such as depression. Only four of the studies found a negative association between attachment bond and depression, while twelve of the 38 studies in which attachment bond was measured found a positive association between attachment bondedness and depression.

Furthermore, of the studies that measured attachment orientations, secure attachment was more often affiliated with lower levels of depression, while anxious and avoidant traits were more often affiliated with higher levels of depression. The three themes summarized above will be discussed in more detail in the following sections.

Differences between pet owners and non-pet owners

We identified 20 studies that included non-pet owners, and 18 of these compared depression levels in pet owners and non-pet owners. Of these studies, 14 (78%) found that there was no significant difference in depression levels between the two groups, four (22%) found that pet owners had lower levels of depression or fewer depressive symptoms than non-pet owners, and no studies found that pet owners had higher levels of depression or more depressive symptoms than non-pet owners. The existing literature related to well-being outcomes in pet owners has shown inconsistent results (Herzog, 2011), and our results appear to align more closely with studies that indicate that pet ownership has either a positive or neutral impact on mental health outcomes (Barcelos et al., 2023; Cleary et al., 2021; Hawkins et al., 2021; Hui Gan et al., 2020). The findings of this systematic review indicate that pet ownership alone may not be beneficial, and that the mental health benefits of pets may depend on individual human-pet relationships and circumstances. However, it should be noted that pet ownership was restrictively defined in this review as individuals currently living with their pet, excluding owners of service animals. While we knowingly adopted a conservative definition here we acknowledge that pet ownership can be more loosely defined.

Attachment bond versus attachment orientations

Attachment orientations have been widely studied in human-human relationships (Hazan & Shaver, 1987; Zimmerman & Katon, 2005), as have their associations with mental health and well-being (Cooke et al., 2019; Seskin et al., 2010; Simpson & Rholes, 2012). Likewise, social bonds and their associations with mental health have also been researched in human-human relationships (Bitzan, 1998; Cohen et al., 2023; Davis et al., 2015), and the differentiation between attachment orientations (e.g., secure vs anxious or avoidant), and attachment bond is more clearly defined in human-human relationship research. In contrast, these two definitions are conflated within human-pet relationship research, often being used interchangeably as “attachment”. This review found that work in the human-pet attachment field as it relates to depression outcomes has largely focused on attachment bond, with only seven (18%) of the included studies focusing on attachment orientations, demonstrating an ambiguity in the human-pet relationship field related to how attachment is defined, and how it is studied.

In our review, studies measuring attachment in two very distinct ways emerge utilizing the same search criteria, which creates potential confusion for the field. This issue could be addressed by differentiating between attachment bond and attachment orientations more clearly and consistently across the field. Variability in measures is an ongoing issue in the field of psychology, and creates concerns related to the validity of study conclusions (Flake & Fried, 2020). Addressing these methodological issues within the human-animal interaction field will allow for more rigorous studies in the future and could address the inconclusive findings relating to the mental health benefits of pets. A

clearer definition of how “attachment” to a pet is conceptualized, and the difference to a human-pet “bond” will be important.

Association between attachment and depression

Results related to the association between attachment bond and depression were varied in this systematic review; however, there is a theme among the included studies that indicates that attachment bond may either have a generally positive or neutral association with depression. Twelve of the studies in which attachment bond was measured indicated a positive association, while 14 others indicated no significant association. It is important to note that, although we did not collect the frequency of ceiling effects within the measurement of attachment as part of this review, this may be a general concern related to the measurement of attachment in this field, and may impact the association between attachment and depression as found in this systematic review.

It is interesting to consider why a positive association between attachment bond and depression might exist. One potential cause could be related to the variable of human social support. Research indicates that higher levels of human social support may play a role in well-being outcomes (Chen & Feeley, 2014; Lee et al., 2018). Existing literature indicates that high levels of social support and low levels of social strain together contribute to less loneliness and improved overall well-being (Chen & Feeley, 2014). Other studies indicate that it is perceived social support that is truly linked to improved well-being (Huang & Zhang, 2022; Lee et al., 2018). Perhaps if an individual feels more highly attached to their pet, that individual is less likely to seek out human social support,

leading to more depressive symptoms. The variable of human social support was incorporated in a study by Antonacopoulos & Pychyl (2010) included in this systematic review. This study indicated that when pet owners have high levels of social support, level of attachment bond does not impact level of depression, but when pet owners have low levels of social support, high levels of pet attachment bond are associated with higher levels of depression. However, this study was the only one in this systematic review to include this variable. Human social support should be included more frequently into studies of this kind to further explore its impact on the interaction between pet attachment bond, pet attachment orientation, and depression.

Other social factors such as perceived pet responsiveness and perceived pet insensitivity may also be variables that impact the interaction between attachment and depression. Perceived responsiveness and perceived insensitivity have largely been studied within the context of human partner relationships (Reis, 2013), but are more recently being studied within the context of human-pet relationships as well (Ellis et al., 2024). Perceived partner responsiveness refers to an individual's perception that their partner is caring and validating related to their needs, concerns, feelings, and thoughts (Reis, 2013; Itzchakov et al., 2021), while perceived partner insensitivity refers to an individual's perception that their partner is detached or uncaring (Crasta et al., 2021). Recent research on these two relationship science concepts within human-pet relationships has revealed a strong negative correlation between perceived pet insensitivity and attachment bond, and a strong positive correlation between perceived pet responsiveness and attachment bond (Ellis et al., 2024). The directionality of this association is not known; regarding

perceived pet responsiveness, these results could indicate that perhaps individuals who find their pets to be responsive also have a stronger attachment bond, or perhaps the individuals who have a stronger attachment bond to their pets perceive their pets as being more responsive due to the high level of attachment. Conversely, regarding perceived pet insensitivity, these results could indicate that perhaps individuals who find their pets to be more insensitive have a weaker attachment bond, or perhaps the individuals who have a weaker attachment bond to their pets perceive their pets as being more insensitive due to the low level of attachment bond.

Another potential variable that may impact the interaction between attachment and depression in the human-pet relationship is the presence of illness or another stressor. In the study by Ingram & Cohen-Filipic (2019) included in this review, it was found that there was an inverse association between attachment and depression scores for patients who had completed cancer treatment, with patients in this group reporting higher levels of attachment and lower levels of depression. However, among patients who were still undergoing treatment, higher levels of attachment were associated with more depressive symptoms. The direction of this association is not known; perhaps individuals with cancer are more depressed due to their health condition, and are more attached to their animals as a form of support during this difficult time. Conversely, perhaps individuals with cancer who are highly attached to their animals are more prone to high levels of depression due to fears related to mortality and concerns about caring for their pet. More research is needed in this area to explore the directionality of this association, as well as

any other variables present influencing the association between attachment and depression.

A fourth potential cause for the positive association between attachment and depression could be the relatively unstudied separation anxiety from pets. Research indicates that individuals who report higher levels of attachment to their pets also experience higher levels of separation anxiety related to leaving their pets (Carr & Pendry, 2022; Dowsett et al., 2020). Furthermore, dog owners who experience more guilt related to the competing demands of work and pet ownership also experience higher levels of depression (Kogan et al., 2022). Separation anxiety is generally linked to higher levels of depression (Silove et al., 2010). This literature points to a link between pet attachment bond, separation anxiety, and depression; however, more research is needed to understand this association more fully.

Furthermore, because most studies included in this systematic review were cross-sectional or cohort studies, the directionality of the attachment bond-depression association cannot be known. Individuals experiencing depressive symptoms may be recommended to adopt a dog to assist in the treatment of depression (Mota Pereira & Fonte, 2018), and many pet adopters or purchasers report the expectation that their new pet will help them to feel happier, less lonely, and less stressed (Powell et al., 2018). Additionally, during the COVID-19 pandemic, which was a period of significant social isolation and increased depression for many people, dog adoption increased dramatically (Morgan et al., 2020; Robb et al., 2020), indicating a potential attempt to self-treat

loneliness and depression through pet acquisition. This past literature indicates that perhaps individuals who are more depressed may be more likely to form strong attachment bonds to their pets and so this could be empirically tested in future research.

Human attachment studies indicate that individuals with insecure attachment orientations can develop negative or dysfunctional cognitive schemas about the self and others, which can increase risk for depression; such schemas are central to Beck's (1967) cognitive model of depression. Insecure attachment orientations can extend to human-pet relationships (Beck & Madresh, 2008; Zilcha-Mano et al., 2011), with anxiously attached individuals displaying more negative evaluations of their pets (Coy & Green, 2018). Pet attachment orientations should therefore be considered in future studies due to the potential increased risk for psychopathology.

Interaction between attachment bond and attachment orientations

Five of the studies that included a measure of attachment orientations explored the association between attachment orientation and attachment bond. Because of the small number of studies that explored this comparison, it is difficult to make conclusions about overarching themes. However, two distinct results appeared in two different manuscripts: that attachment anxiety correlates positively with attachment bond, and that attachment avoidance correlates negatively with attachment bond. However, these results were not replicated by the other three studies, and no other single result appeared in more than one study. More research is needed in this area to explore how these two operationalizations of attachment interact with one another.

Interaction between attachment and depression in specific populations

Two specific populations were included in the analysis of this review: older adults and women. Results of the studies focusing on women largely aligned with the overall results of the studies included in this review. Interestingly, however, the studies focusing on older adults much more frequently found a positive association between attachment and depression. Prevalence of depression in older adults is lower overall than in younger adults, but rates of suicide are higher (Fiske et al., 2009). Additionally, depression in older adults is frequently under-treated, potentially explaining the higher frequency of morbidity (Kok et al., 2017). It is possible that self-treatment through pet acquisition (Mota Pereira & Fonte, 2018) occurs specifically in this population. Furthermore, social isolation is a prevalent issue for older adults (Nicholson, 2012). As Antonacopoulos & Pychyl (2010) found, when pet owners have low levels of social support, high levels of pet attachment are associated with higher levels of depression, and perhaps this could also be an explanation for the higher-than-average number of studies indicating a positive association between attachment bond and depression for this population.

Differences based on pet type

Of the pet owners who participated in the studies included in this review, the majority were dog or cat owners, with significantly more being dog owners. Five of the studies included in this review focused solely on dog owners, while two focused solely on cat owners. All single-animal studies focused on attachment bond only, and not on attachment orientations. Four of the studies with dog owners only did not analyze the

association between attachment bond and depression, while the remaining study found a positive association between attachment and depression. Both studies of cat owners found no significant association between attachment bond and depression. Perhaps the differences in results relate to self-treatment of depression, as discussed above. Further exploration of this association within cat owners and dog owners could highlight some interesting differences between these two groups. For example, one study found that while dog owners have a stronger attachment bond with their pets than cat owners, there was no significant difference between the two groups related to depression (Ellis et al., 2024).

Unpublished and published works

The similarity in quality scores between unpublished and published works (9.6 to 9.3) highlights the importance of including so-called grey literature into systematic reviews such as this one. We chose to include unpublished works in this systematic review to address issues related to publication bias. The unpublished works provided useful information to this review, especially as related to pet attachment orientation where they accounted for nearly half of the literature included in this review. This highlights the need for continued assessment of the quality of unpublished works and its inclusion in reviews.

Limitations

This systematic review was limited by only including studies published in English. Furthermore, this study included a significant number of unpublished dissertations; although this was purposeful to address issues related to publication bias, this issue

should be noted when interpreting the results of the review. Lastly, this review included studies with a wide variety of populations and methodology. Although this diversity enables us to explore these concepts with a large variety of populations, lack of homogeneity precluded the completion of a meta-analysis of study results.

Conclusion

This systematic review sought to explore how attachment is operationalized within the human-pet relationship research field, as well as how attachment plays a role within pet relationships and the specific well-being outcome of depression. Most studies measuring attachment bond indicated either a neutral or positive association between attachment bond and depression, and few studies point to the opposite conclusion, indicating that attachment bond may be an important component within the pet-depression link.

Furthermore, many studies measuring attachment orientations found that attachment insecurity is positively related to depression, consistent with human-human attachment studies. However, some studies also reflected quite inconsistent results, and perhaps additional variables not studied interacting with attachment, may have influenced depression levels. These results should be interpreted with caution due to the measurement concerns related to attachment, as well as the potential impact of these other unstudied variables. This review also confirmed that there are significant challenges in the human-companion animal research field related to the operationalization of attachment. While most studies explored the human-pet attachment bond, there are also studies regarding attachment orientation within the human-pet relationship that are robust and interesting, leading to a more complicated picture of attachment within the human-

pet relationship. More clarity is needed in this field regarding what types of interactions are designated as attachment, and further work is needed in this field in order to address the methodological and theoretical inconsistency in the use of the concept of attachment. Our findings collectively inform the broader field of human-animal interactions in three distinct ways: 1) they synthesize the existing research related to pet attachment and depression; 2) they highlight current measurement issues within the field; and 3) they provide differentiation between two distinct operationalizations of attachment within the human-pet relationship field.

Notes:

Some literature cited in this systematic review included previous terminology for attachment orientations which are no longer in use. We have updated the language used in this review to be the most up-to-date terminology.

Our quality assessment deviates slightly from our preregistration. We included the Jadad scale (Jadad et al., 1996) as a component of the quality assessment at time of preregistration; however, we later discovered that the Jadad scale did not capture all of the elements we wished it to measure. For this reason, we instead utilized the Quality Assessment Index.

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