Behavioural and Cognitive Psychotherapy, 2026, page 1 of 19
doi:10.1017/S1352465826101398

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Loneliness in hoarding disorder: a systematic review and meta-analysis

Keong Yap[1], Isaac Sabel[2], David D.J. Cooper[3], Wenting Chen[2] and Jessica R. Grisham[2]

[1]School of Behavioural and Health Sciences, Australian Catholic University, Strathfield Campus, Australia, [2]School of Psychology, UNSW Sydney, Australia and [3]School of Clinical Medicine, Discipline of Psychiatry and Mental Health, UNSW Sydney, Australia
Corresponding author: Keong Yap; Email: keong.yap@acu.edu.au

(Received 11 March 2026 UTC; revised 11 March 2026 UTC; accepted 22 June 2026 UTC)

Abstract

Introduction: According to attachment theory, loneliness may be a cause of hoarding symptoms. However, due to mixed findings, it is unclear whether people with hoarding disorder (HD) are lonelier than healthy and clinical controls, whether there is a significant positive association between loneliness and hoarding, and whether loneliness causes more severe hoarding.

Method: We conducted a systematic review and included peer-reviewed quantitative cross-sectional, longitudinal, experimental and intervention research that measured hoarding and loneliness. We excluded hoarding due to other conditions and qualitative, review, and case study research. The final search was conducted on 16 May 2025 on PsycINFO, Medline, and Web of Science. We used the Quality Assessment with Diverse Studies to evaluate study quality and conducted a random effects meta-analysis to examine loneliness-hoarding correlations.

Results: Eleven papers with 13 studies ($n = 2715$) were included. Four studies compared loneliness in HD relative to controls. Ten studies examined the association between hoarding and loneliness. Only one experimental study examined the causal link. Results showed significantly higher loneliness in HD relative to healthy controls, but findings were mixed when compared with clinical controls. The meta-analysis showed a significant association between loneliness and hoarding, $r = .38$ [95% CI .33, .44].

Discussion: Our findings confirm that loneliness is a significant issue in HD. Due to its wide-ranging effects, we recommend that clinicians should assess and address loneliness in HD. Although we are confident that loneliness is positively associated with hoarding, further research is required to establish a causal link.

Keywords: hoarding; hoarding disorder; loneliness; meta-analysis; obsessive-compulsive related disorders; systematic review

Introduction

Hoarding disorder (HD) is a severe psychological disorder characterized by an excessive need to acquire and save possessions, persistent difficulties in making decisions about belongings, and emotional distress when discarding items regardless of their actual value. The accumulation of objects in the home results in cluttered and unusable rooms (American Psychiatric Association, 2022). It has an estimated prevalence of 2.5% and affects both men and women equally (Postlethwaite *et al.*, 2019). Although people with HD typically present for treatment in late

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adulthood, many report a childhood onset of hoarding symptoms that persist and become more severe over time (Akıncı et al., 2022; Grisham *et al.*, 2006; Tolin *et al.*, 2010).

People with HD have high levels of overall functional impairment across multiple domains (Ong *et al.*, 2015). In particular, several recent studies have focused on loneliness in hoarding and have shown that people with HD have high levels of loneliness and that hoarding severity is positively associated with loneliness (Edwards *et al.*, 2023; Yap *et al.*, 2023). Given that loneliness is a modifiable treatment target (Hickin *et al.*, 2021; Morrish *et al.*, 2023), Yap *et al.* (2023) suggested that addressing loneliness for people with hoarding problems may lead to improvements in both hoarding and other co-morbid conditions. However, there has been no review of loneliness research in hoarding disorder and the evidence on potential treatment targets for loneliness is unclear.

The negative impact of loneliness

Loneliness is 'the distressing feeling that accompanies the perception that one's social needs are not being met by the quantity or especially the quality of one's social relationships' (Hawkley and Cacioppo, 2010; p. 218). It is a common emotional response to social isolation, but, as it is a subjective experience, individuals can experience loneliness even when they are not alone or conversely, may not feel lonely when in solitude (Ost-Mor *et al.*, 2021). Loneliness is experienced when there is a perception that social needs are not met. For most people, loneliness motivates engagement in meaningful social connections. However, individuals who experience chronic and severe loneliness can perceive the social environment as more threatening and thus avoid connecting with others (Cacioppo and Hawkley, 2009), or they may develop social anhedonia – a lack of interest and pleasure in social connections, which may lead to chronic loneliness (Barkus and Badcock, 2019). Chronic loneliness is associated with physical and mental health problems, and leads to higher mortality rates (Zhou *et al.*, 2023).

Hoarding and loneliness

Hoarding may lead to greater social isolation and loneliness because it is associated with high levels of stigma and shame (Chasson *et al.*, 2018; Chou *et al.*, 2018; Prosser *et al.*, 2024). People with HD often avoid inviting others to their homes because they fear being judged and the secrecy surrounding their hoarding intensifies feelings of loneliness. Hoarding also results in strained relationships with family, friends, and neighbours (Subramaniam *et al.*, 2020). Furthermore, cluttered homes lead to increased health and safety risks, which may prevent friends and family from visiting (Dong *et al.*, 2012).

In addition to being a consequence of hoarding, loneliness may also cause more severe hoarding behaviours. According to attachment theory, people have an innate need to connect with others and form close relationships (Bowlby, 1978). This need is present from infancy, when children seek out and form close emotional bonds with their caregivers, and it extends across the lifespan as individuals seek proximity to others and rely on intimate relationships and friendships for support. Due to a combination of temperament and negative early childhood experiences, some individuals develop insecure attachment styles that have an ongoing negative impact on interpersonal relationships and wellbeing (Mikulincer *et al.*, 2003). Mathes *et al.* (2020) argued that some individuals with insecure interpersonal attachment styles turn to inanimate objects as substitutes for interpersonal relationships. They imbue objects with human-like qualities, rely on them for comfort and support, and use objects to compensate for unmet relatedness needs (Timpano and Shaw, 2013; Yap and Grisham, 2019). This compensatory process does not fully satisfy relatedness needs because objects do not reciprocate connection in the same way as people do. Furthermore, object attachment in hoarding is characterised by anxiety and insecurity and

therefore may paradoxically intensify hoarding behaviours and lead to greater loneliness (Yap and Grisham, 2021).

Consistent with this compensatory process, research has shown that hoarding is positively associated with insecure interpersonal attachment (Chia *et al.*, 2021) and that people with HD are more likely to report a history of interpersonal trauma and emotional deprivation (Sanchez *et al.*, 2023). Cross-sectional studies have also demonstrated a positive association between loneliness and hoarding (Yap *et al.*, 2020). However, to have confidence that loneliness is a cause, in addition to being a consequence, of hoarding, longitudinal and experimental research are required, which unfortunately has been limited.

Aims and objectives

In this review, we aimed to examine the link between loneliness and hoarding, and to answer three specific questions that further our understanding of this relationship. Firstly, how lonely are people with HD compared with clinical and healthy controls? Secondly, what is the strength of the association between loneliness and hoarding symptoms? Thirdly, what is the evidence that loneliness causes hoarding? We will also identify the limitations of the literature to date and propose a program of research to address these gaps.

Method

Eligibility criteria

Included studies were (1) quantitative studies, including cross-sectional, longitudinal, experimental research, and intervention studies, (2) that had either assessed participants using a validated measure of hoarding symptoms or comprised participants with hoarding disorder, (3) included a validated measure of loneliness, and (4) were published in a peer-reviewed journal. For experimental studies, we also included studies (5) with experimental conditions that increased social rejection, social exclusion, or intervened to improve loneliness and had assessed the impact of change in loneliness on hoarding symptoms. These studies needed to have assessed loneliness to confirm that the manipulation had the intended effect.

Excluded studies were (1) qualitative studies, case studies, and reviews, (2) had participants with hoarding problems due to another condition other than hoarding disorder, such as dementia, psychosis, or obsessive-compulsive disorder, and (3) examined squalor or Diogenes syndrome without an assessment of hoarding severity. Although hoarding may be present in people living with squalor or who have Diogenes syndrome, we decided to exclude such studies because the cause of hoarding in these cases is often due to co-morbid conditions such as dementia or psychosis.

Data sources and search strategy

The literature searches were conducted in three databases: PsycINFO, Medline, and Web of Science, using the terms related to loneliness and hoarding in the title, abstract, and subject headings. Please see Table 1 for the line-by-line search strategy. No restrictions were placed on the year of dissemination or language of the papers. The initial search was conducted on 3 June 2024 and updated twice on 16 January 2025 and 16 May 2025.

Selection process

Two reviewers (K.Y. and I.S.) independently conducted the title/abstract screen for all retrieved papers and the subsequent full-text screen (K.Y. and W.C.). Disagreements were resolved by a

Table 1. Search strategy

PsycINFO (Default search limits = title, abstract, MeSH Subject Heading), Medline Complete (Default search limits = title, abstract, MeSH Subject Heading), Web of Science Core Collection (Default search limits = title, abstract, Research Area)
1. loneliness
3. lonely
4. 'social isolation'
5. 'thwarted belongingness'
6. 'social rejection'
7. 'social support'
8. #1 OR ... #8 – loneliness and related terms
9. hoard*
10. clutter
11. #9 OR #10 – hoarding and related terms
12. #8 AND #11 – hoarding and loneliness

third reviewer (J.G. or D.C.). Authors for papers in another language would be contacted for the required information.

Data collection process and data items

Two reviewers (K.Y. and D.C.) independently extracted data from all included papers. Data extracted included the primary aim of study, sample size and characteristics (age, gender, type of participants, i.e. non-clinical, or clinical, diagnoses), type of assessments of loneliness and hoarding used, means and standard deviations of loneliness and hoarding, zero-order correlations between loneliness and hoarding, and effect sizes for differences between groups. If more than two measures of hoarding severity or loneliness were used, we extracted data from the more frequently used and well-validated measures used in the literature.

Risk of bias assessments

We used the Quality Assessment with Diverse Studies (QuADS) tool to evaluate study quality (Harrison *et al.*, 2021). The tool outlines 13 criteria for rating studies. Each item is scored from 0 (lowest quality – no information available) to 3 (highest quality). Scores for the QuADS range from 0 to 39, where higher scores represent higher study quality. As per the recommended guidelines, two authors (I.S. and W.C.) independently applied the QuADS criteria to three studies and then met to consolidate a shared understanding of how to best apply the criteria, before independently rating the remaining studies. The final concordance rate between the authors indicated substantial agreement ($\kappa = .76$; see Appendix A in the Supplementary material).

Data analysis

To examine the association between loneliness and hoarding across studies, we conducted a meta-analysis using a random-effects model in R (version 4.4.2) with the *metafor* package (Viechtbauer, 2010). We transformed correlation coefficients to Fisher's z scores and computed corresponding variances based on sample sizes. We used the restricted maximum likelihood (REML) estimator to estimate the pooled effect size and assessed heterogeneity using Cochran's Q, I^2, and tau^2 statistics. We then generated a forest plot to visualise the individual and pooled effects with a 95% prediction interval. Outliers and influential studies were identified by examining the studentised residuals and Cook's distances. Finally, we assessed publication bias using funnel plot asymmetry, the rank correlation test, and Egger's regression test. All significance tests were two-tailed at alpha of .05.

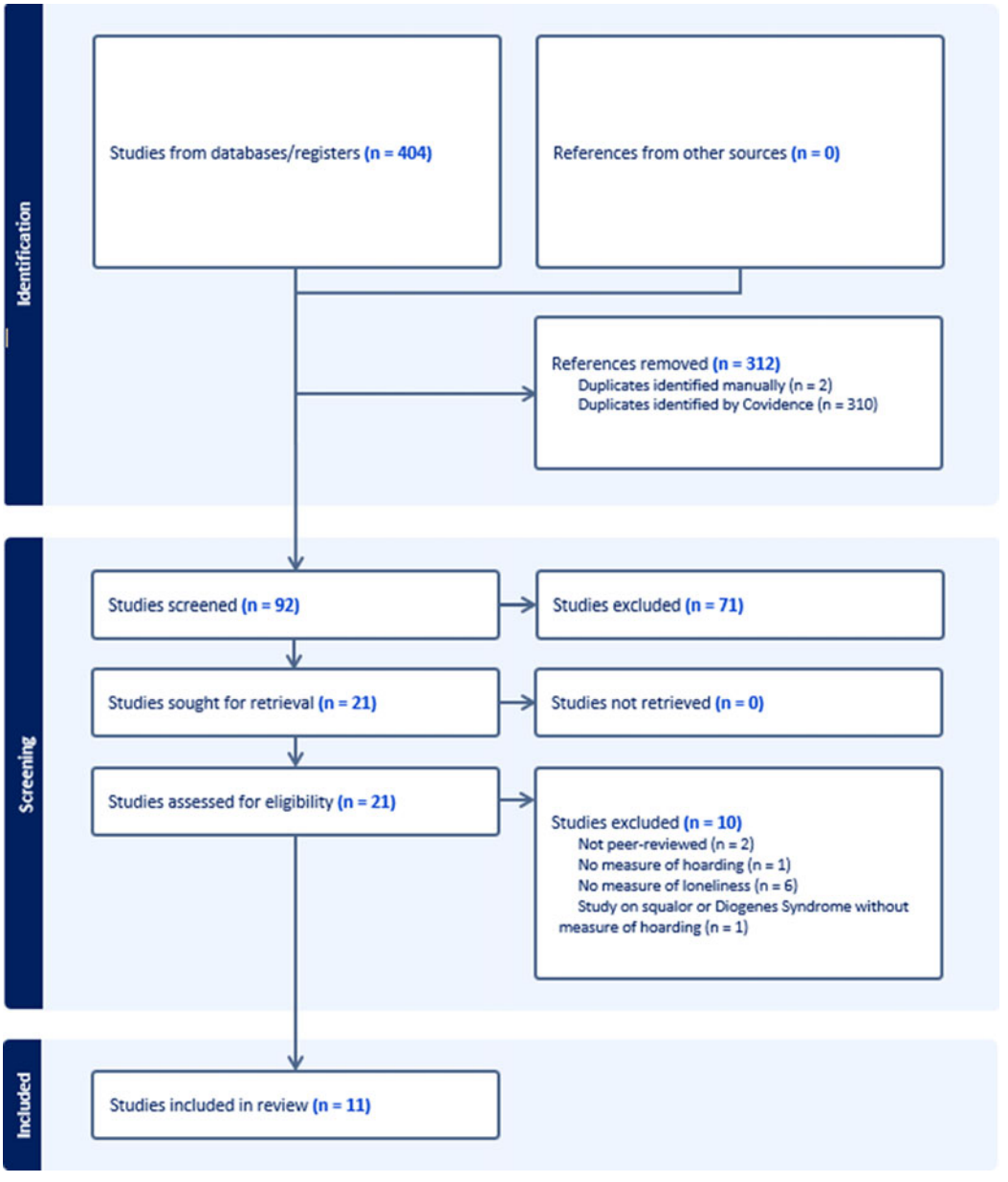


Figure 1. PRISMA flow diagram.

Results

Figure 1 presents the PRISMA flow diagram showing the selection and inclusion of studies. We identified 124 studies from the three databases in the initial search, 134 in the first update and 146 in the final update, resulting in a total of 404 studies. Two duplicates were identified manually and 310 automatically by Covidence, leaving 92 studies for title and abstract screening (K.Y. and I.S.). The inter-rater reliability analysis for the title and abstract screening showed a proportionate agreement of 0.94 and a Cohen's kappa of 0.84, indicating strong agreement between reviewers. Discrepancies occurred in six cases and were resolved by a third reviewer (J.G. or D.C.). The title

and abstract screen resulted in 21 full-text studies, which were then assessed for eligibility by two reviewers (K.Y. and W.C.). The inter-rater reliability showed a proportionate agreement of 0.85 and Cohen's kappa of 0.70, indicating strong agreement. Discrepancies occurred in three cases and were resolved by a third reviewer (D.C.). Eleven studies in total met inclusion criteria and were included in the current review. There were a total of 2715 participants. Details of the studies are presented in Tables 2 and 3. All studies were conducted in English speaking countries (US, Canada, UK, or Australia).

Risk of bias in studies

The QuADS analysis indicated that the studies included were generally of a high quality. Most studies had strong theoretical and conceptual underpinnings, clearly stated their research aims, utilised appropriate data collection tools, employed suitable analytic methods, and provided a balanced discussion of the relative strengths and weaknesses of their research. However, studies were more heterogenous in quality when it came to the appropriateness of their sampling methods and research designs. Many studies relied on analogue samples of undergraduates or participants from crowdsourcing platforms, who were either unselected or had elevated scores on a hoarding symptom measure, rather than clinical HD participants. Many studies also only provided a cross-sectional analysis of the hoarding–loneliness link at one time point and failed to justify why these designs were used over longitudinal or experimental research methods. Several studies were also missing key pieces of information about their data collection and recruitment processes (i.e. how many participants were approached, how many declined to participate). There was a critical lack of stakeholder/consumer co-design across the included literature, with only two studies providing evidence of this. See Fig. 2 for a weighted bar plot summary of the distribution of risk-of-bias judgements within each bias domain, as per the QUADS assessment.

How lonely are people with HD compared with healthy and clinical controls?

Four studies compared people with HD with a control group on loneliness levels (Barton *et al.*, 2021; Bedi and Woody, 2025; Edwards *et al.*, 2023; Yap *et al.*, 2023). Three used the UCLA Loneliness Scale and one used a single item in the Center for Epidemiological Studies-Depression (CES-D) 20-item measure to assess loneliness (Bedi and Woody, 2025). All studies showed significantly higher loneliness among hoarding participants compared with healthy controls with moderate to large effect sizes. The studies using the UCLA Loneliness Scale found that the average levels of loneliness in people with HD ranged from moderate to severe levels (based on recommended cut-offs in Cacioppo and Patrick, 2008). Furthermore, in a *post-hoc* analysis, Yap *et al.* (2023) showed that individuals with high levels of hoarding ($n = 262$, $M_{\text{UCLA-LS}} = 52.3$, $SD = 12.8$) were significantly lonelier than a low hoarding group who were matched on depression severity ($n = 262$, $M_{\text{UCLA-LS}} = 49.8$, $SD = 15.4$), Welch's t (d.f. = 505.7) = 2.00, $p = .046$, Cohen's $d = 0.18$.

Barton *et al.* (2021) and Edwards *et al.* (2023) also compared the HD group with an OCD group. While both studies showed that HD and OCD participants were significantly lonelier than healthy controls with large effect sizes, Barton *et al.* reported no significant difference between HD and OCD. By contrast, Edwards *et al.* found significantly higher loneliness in the HD group compared with the OCD group with a medium effect size.

One additional study compared a HD analogue sample with a compulsive buying analogue sample on levels of loneliness (Norberg *et al.*, 2020). They found that both groups had loneliness scores in the moderate range but there was no significant difference between the two groups. Nevertheless, the HD group reported higher levels of anxious attachment and more interpersonal problems than the compulsive buying group.

Table 2. Summary of findings – study design and sample characteristics

Author (year)	Country	Study design	Recruitment method	Sample size	Demographic characteristics
Barton *et al.* (2021)	UK	Cross-sectional between-subjects design with three groups (HD, OCD, HC)	HD and OCD: social media, HD/OCD advocacy organisations HC: Social media, social groups for older adults, snowballing	• HD, $n = 38$ • OCD, $n = 46$ • HC, $n = 49$ (total $n = 133$)	• HD: $Mdn_{age} = 50.59$ (IQR = 14.00), female gender = 70.3%, Caucasian = 97.4% • OCD: $Mdn_{age} = 38.00$, IQR = 18, female gender = 67.4%, Caucasian = 93.5% • HC: $Mdn_{age} = 63.00$, IQR = 22, female gender = 63.3%, Caucasian = 91.7%
Bedi and Woody (2025)	Canada	Cross-sectional between-subjects design with two groups (HD, HC)	Online and community advertisements	• HD, $n = 57$ • HC, $n = 60$ • Subclinical HD/other disorder, $n = 41$ (total $n = 158$)	• HD: $M_{age} = 51.30$ ($SD = 13.41$), female gender = 66.7%, White = 66.7% • HC: $M_{age} = 44.60$ ($SD = 14.46$), female gender = 58.3%, White = 58.3%
Broos *et al.* (2024)	USA	Correlational, cross-sectional and ecological momentary assessment	Undergraduate students during COVID-19 from psychology department recruitment pool and wider university community	$n = 137$	$M_{age} = 19.52$ ($SD = 12.36$), 27.7% male, 70.1% female; 57.7% White, 16.1% Black, 13.9% Asian, other 8.8%
Burgess *et al.* (2018)	USA	Cross-sectional correlational	Advertisements in courses and flyers on campus in an all-women's liberal arts college	$n = 232$	$M_{age} = 20$ ($SD = 3.78$), 95.7% female, 0.4% male, other = 4.0%; 60% White, 22% Asian, 6.5% African-American, 12% Hispanic and 11% mixed/other
Chen *et al.* (2023)	Australia	Single arm feasibility and acceptability study	Advertisements on university clinic website and previous research participants with HD who consented to be contacted, local treatment groups	$n = 12$	$M_{age} = 59.87$ ($SD = 12.63$). nine female, one transgender female, two male. 11 White, 1 Asian
Edwards *et al.* (2023)	UK	Cross-sectional	Recruited through advocacy organisations, social media and snowballing	HD, $n = 37$ OCD, $n = 31$ HC, $n = 45$ (total $n = 113$)	• $M_{age} = 58.76$ ($SD = 10.19$), 81.1% female, 89.2% Caucasian • OCD: $M_{age} = 38.87$ ($SD = 11.05$), 77.4% female, 90.3% Caucasian • HC: $M_{age} = 51.42$ ($SD = 19.37$), 80.0% female, 88.9% Caucasian Total: $M_{age} = 50.38$ ($SD = 16.54$)

(*Continued*)

Table 2. (*Continued*)

Author (year)	Country	Study design	Recruitment method	Sample size	Demographic characteristics
Norberg *et al.* (2020)	Australia	Quasi-experimental, non-equivalent groups design.	Undergraduate students, advertisements posted online and in public area local to the university. All participants scored >11 on the SI-R excessive acquisition subscale	• Acquiring Only group (SI-R Difficulty Discarding ≤12), $n = 59$ • Acquiring & Discarding group (SI-R Difficulty Discarding >=15, $n = 121$ (total, $n = 180$)	• Acquiring Only group: $M_{age} = 20.29$ ($SD = 3.88$), 83.1% female, 32.2% Anglo Australian, 27.3% Asian • Acquiring & Discarding group: $M_{age} = 22.55$ ($SD = 7.18$), 78.5% female, 42.1% Asian, 29.8% Anglo Australian
Weiss *et al.* (2020)	USA	Pre-test–post-test design	Recruited with assistance of a community-based social service agency. Mental health professional identified individuals with significant hoarding behaviours	$n = 29$	$M_{age} = 67$ ($SD = 8$). 20 female, 9 male
Yap *et al.* (2020)	Australia	Correlational, cross-sectional	Study 1 - social media posts & snowball Study 2 - undergraduate psychology students	• Study 1, $n = 213$ • Study 2, $n = 91$	• Study 1 $M_{age} = 44.7$ ($SD = 10.6$); 178 women, 35 men • Study 2 $M_{age} = 23.15$ ($SD = 5.24$), 64 female, 26 male
Yap *et al.* (2023)	Australia & USA	Study 1. Observational one group design. Study 2. Observational non-equivalent groups design.	Study 1: participants attending group treatment for HD Study 2; MTurk workers	• Study 1, $n = 39$ • Study 2, HH group $n = 305$ LH group $n = 775$ (total $n = 1080$)	• Study 1, $M_{age} = 60.63$ ($SD = 8.69$), 31 women, 7 men • Study 2, High hoarding group, $M_{age} = 38.90$ ($SD = 11.95$), 43.3% man, 55.1% woman, 1.6% other; 71.1% White, 8.9% Black, 8.2% Asian, 5.6% Hispanic, 3.9% other • Study 2, Low hoarding group, $M_{age} = 43.23$ ($SD = 13.07$), 49.2% man, 50.3% woman, 0.5% other; 78.6% White, 7.0% Black, 7.4% Asian, 4.9% Hispanic, 2.2% other
Yap *et al.* (2024)	USA	Experimental	Via cloudresearch.com	Total $n = 298$ Randomly assigned to loneliness intervention ($n = 142$) *vs* active control ($n = 156$)	$M_{age} = 40.78$ ($SD = 12.13$), 60.7% woman, 37.6% man, 0.7% non-binary. 74.8% White, 8.1% Black, 9.4% Asian, 4.4% Hispanic, 3.4% other

HD, hoarding disorder; OCD, obsessive-compulsive disorder; HC, healthy controls.

Table 3. Summary of findings – measures, loneliness severity, and correlations

Author (year)	Loneliness measure and severity	Hoarding measure	Hoarding severity	Findings: group differences in loneliness and zero order correlations between hoarding and loneliness
Barton *et al.* (2021)	UCLA-LS HD mean = 47.10 (*SD* = 13.76) OCD mean = 48.86 (*SD* = 12.09) HC mean = 31.49 (*SD* = 15.29).	Hoarding and OCD groups based on SCID-5 Hoarding severity: SI-R, OCI-R hoarding subscale	HD group • Mdn SI-R = 64 (IQR: 20.50); • Mdn OCI-R Hoarding item = 6.50 (IQR: 4.00)	HD > HC, Cohen's *d* = 1.06 OCD > HC, Cohen's *d* = 1.24 HD = OCD, Cohen's *d* = −0.15 Correlations not reported
Bedi and Woody (2025)	Loneliness item from CES-D HD mean = 1.26 (*SD* = 1.06) HC mean = 0.53 (*SD* = 0.83)	SI-R, Clutter Image Rating	• HD: Mean SI-R = 58.53 (*SD* = 12.45) • HC: Mean SI-R = 17.22 (*SD* = 11.72)	HD > HC, Cohen's *d* = 0.77 *r* (SI-R, CES-D loneliness) = .42, *p* < .05
Broos *et al.* (2024)	INQ-TB Mean = 25.18 (SD = 11.44)	SI-R difficulty discarding & acquisition subscales	Mean SI-R Discarding = 7.26 (*SD* = 5.41) Mean SI-R Acquisition = 7.35 (*SD* = 4.97)	*r* (SI-R Discarding, INQ-TB) = .34, *p* < .01 *r* (SI-R Acquisition, INQ-TB) = .44, *p* < .01
Burgess *et al.* (2018)	UCLA-LS Mean = 46.34 (SD = 10.99)	SI-R	Mean SI-R = 25.93 (SD = 14.83)	*r* (SI-R, UCLA-LS) = .40, *p* < .001
Chen *et al.* (2023)	DJGLS Pre mean = 9.00 (*SD* = 2.98) Mid mean = 7.33 (*SD* = 4.12), Post mean = 7.42 (*SD* = 3.73) 1-month mean = 6.83 (*SD* = 4.53)	DIAMOND interview SI-R	Pre: Mean SI-R = 66.75 (*SD* = 10.33). Mid: Mean SI-R = 60.92 (*SD* = 10.14) Post: Mean SI-R = 55.33 (*SD* = 13.01) 1-month: Mean SI-R = 56.57 (*SD* = 13.72)	Correlations obtained via personal communication (March, 2025) At time 1, *r* (SI-R, DJGLS) = .116, *p* = .72
Edwards *et al.* (2023)	UCLA-LS HD Mean = 34.65 (*SD* = 11.60) OCD Mean = 27.77, *SD* = 14.05 HC Mean = 19.73, *SD* = 12.31	Hoarding and OCD groups based on SCID-5 Hoarding severity: SI-R, OCI-R hoarding subscale	HD: Mean SI-R = 60.92 (*SD* = 15.60) OCD: Mean SI-R = 23.81 (*SD* = 19.47) HC: Mean SI-R = 12.31 (*SD* = 10.70)	HD > HC, Cohen's *d* = 1.24 OCD > HC, Cohen's *d* = 0.62 HD > OCD, Cohen's *d* = 0.54 Correlations not reported
Norberg *et al.* (2020)	UCLA-LS HD analogue sample (high acquisition and difficulties discarding): mean = 47.03 (*SE* = 0.94) Compulsive buying analogue sample (high acquisition only): mean = 45.27 (*SE* = 1.35)	• HD analogue sample: SI-R difficulty discarding >15 and excessive acquisition > 11 • Compulsive buying analogue sample: SI-R difficulty discarding ≤ 12 and excessive acquisition > 11	• HD analogue: Mean SI-R Acquisition = 16.21 (*SD* = 3.64) Mean SI-R Discarding = 18.18 (*SD* = 2.69) Mean SI-R Clutter = 15.80 (*SD* = 6.25) • Compulsive buying analogue Mean SI-R Acquisition = 14.08 (*SD* = 2.81) Mean SI-R Discarding = 9.58 (*SD* = 1.98) Mean Clutter = 9.97 (*SD* = 6.78)	No significant difference between groups on loneliness. Correlations not reported

(*Continued*)

Table 3. (*Continued*)

Author (year)	Loneliness measure and severity	Hoarding measure	Hoarding severity	Findings: group differences in loneliness and zero order correlations between hoarding and loneliness
Weiss *et al.* (2020)	UCLA-LS Time 1, $n = 27$, mean = 42.11 ($SD = 16.19$). Time 2, $n = 12$, mean = 40.42, ($SD = 15.31$) NB. Findings via personal communication (May, 2023). Author provided results with response scales scored from 0 to 3 per item. Values presented were recalculated using response scales from 1 to 4 to facilitate comparison with other studies	SI-R and CIR; diagnosis based on clinical evaluations by psychiatrist using *DSM-5* criteria	Pre: Mdn SI-R = 50, Mdn CIR = 4 Post: Mdn SI-R = 43, Mdn CIR 3	Time 2: r (SI-R, UCLA-LS = .18, $p > .05$ Time 2: r (CIR, UCLA-LS) = .20, $p > .05$
Yap *et al.* (2020)	UCLA-LS Study 1, mean = 43.5 ($SD = 11.4$) Study 2, mean = 47.3 ($SD = 10.0$)	SI-R	Study 1 mean SI-R = 26.8 ($SD = 16.2$) Study 2 mean SI-R = 38.4 ($SD = 11.7$).	Study 1: r (SI-R, UCLA-LS) = .45, $p < .001$; Study 2: r (SI-R, UCLA-LS) = .35, $p < .001$
Yap *et al.* (2023)	UCLA-LS Study 1 mean = 59.28 ($SD = 7.04$). Study 2 High hoarding (HH) group mean = 53.7 ($SD = 12.8$) Low hoarding (LH) group mean = 40.3 ($SD = 14.5$)	Study 1: SI-R Study 2 HH group: >=14 on HRS-SR Study 2 LH group: <= 5 on HRS-SR	Study 1 mean SI-R = 63.15 ($SD = 14.05$) Study 2 HH group: mean HRS = 19.92 ($SD = 5.53$) LH group: mean HRS = 1.78 ($SD = 1.81$)	Study 1: r (SIR, UCLA-LS = .62, $p < .001$ Study 2: r (HRS, UCLA-LS = .42, $p < .001$ HH group > LH group, Cohen's $d = 0.95$
Yap *et al.* (2024)	UCLA-LS • Loneliness intervention group Time 1 mean = 51.74 ($SD = 14.09$) Time 2 mean = 49.54 ($SD = 12.23$) • Control group Time 1 mean = 52.18 ($SD = 14.19$) Time 2 mean = 51.91 ($SD = 13.99$)	SI-R	• Loneliness intervention group Time 1 mean SI-R = 35.94 ($SD = 15.20$) Time 2 mean SI-R = = 37.42 ($SD = 14.56$) • Control group Time 1 mean SI-R = 35.94 ($SD = 15.20$) Time 2 mean SI-R = 35.45 ($SD = 14.45$)	Correlations obtained via personal communication (April 2025) r (SI-R, UCLA-LS) = .25, $p < .001$, $n = 298$. No significant difference between groups on hoarding severity

CES-D, Centre for Epidemiological Studies Depression Scale; DJGLS, DeJong Gierveld Loneliness Scale; UCLA-LS, UCLA loneliness scale; INQ-TB, Interpersonal Needs Questionnaire-Thwarted Belongingness Subscale; SI-R, Savings-Inventory Revised; CIR, Clutter Image Rating Scale.

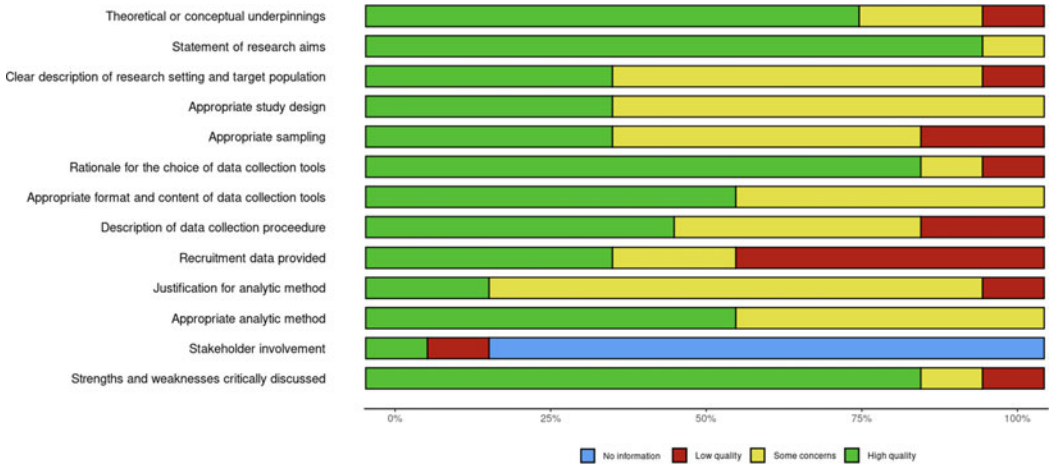


Figure 2. Weighted bar plot of the distribution of risk-of-bias judgements within each bias domain from the QuADS assessment.

Association between loneliness and hoarding

There were six papers with cross-sectional study designs that reported eight zero-order correlations from distinct samples. There were another five papers that reported measuring loneliness and hoarding severity but did not report zero-order correlations. We contacted the corresponding authors and received correlations from two authors resulting in a total of 10 effect sizes from independent samples reported in eight papers and a total sample size of 2287 participants. The loneliness measure most frequently used was the UCLA-Loneliness Scale (UCLA-LS; Russell *et al.*, 1996) and the hoarding measure most frequently used was the SI-R total score. If there were two or more measures of loneliness and hoarding in correlations, we used the correlation between UCLA-LS and SI-R total. If correlations were reported for more than one time point (e.g. Weiss *et al.*, 2020), we used the first time point. Broos *et al.* (2024) used the difficulties discarding and acquisition subscales of the SI-R to measure hoarding symptoms. Given that the SI-R difficulties discarding subscale has a higher sensitivity to detect HD than the acquisition subscale (Kellman-McFarlane *et al.*, 2019), we used the correlation between the SI-R difficulties discarding subscale and the INQ-Thwarted Belongingness subscale from their study.

Meta-analysis

As the correlations between loneliness and hoarding across studies ranged from $r = .12$, $p = .72$ (Chen *et al.*, 2023) to $r = .62$, $p < .001$ (Yap *et al.*, 2023), we conducted a meta-analysis using a random-effects model (REML estimator) to provide a clearer picture of the association. The results showed a moderately strong positive pooled effect size across the 10 studies, $r = .38$ [95% CI .33, .44] (Fig. 3) with moderate heterogeneity ($\tau^2 = 0.0039$, $I^2 = 41.4\%$). The Q-test for heterogeneity was not significant ($Q = 16.15$, $p = .06$) and the 95% prediction interval ranged from 0.266 to 0.543, indicating that future studies would also show positive associations of similar magnitude. Analysis of studentised residuals showed one potential outlier (Yap *et al.*, 2024). Exclusion of the study resulted in a slightly larger pooled effect size, $r = .41$ [95% .38, .45]. We therefore decided to take a conservative approach and retain the study.

The Begg's rank correlation test and Egger's regression test were not significant ($p = .48$ and $p = .66$, respectively). Examination of the funnel plot indicated a low risk of publication bias with most points falling within the funnel and evenly distributed around the pooled estimate (Fig. 4).

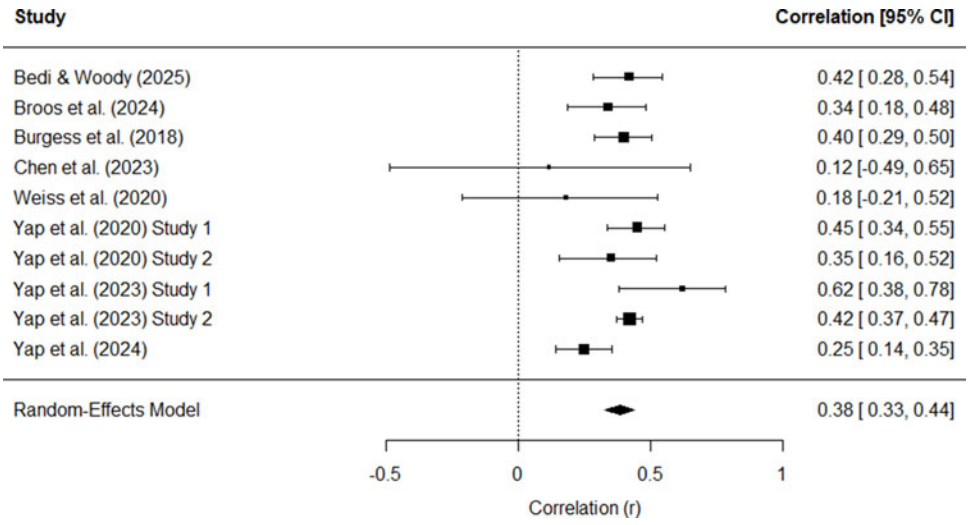


Figure 3. Forest plot of studies examining the association between loneliness and hoarding.

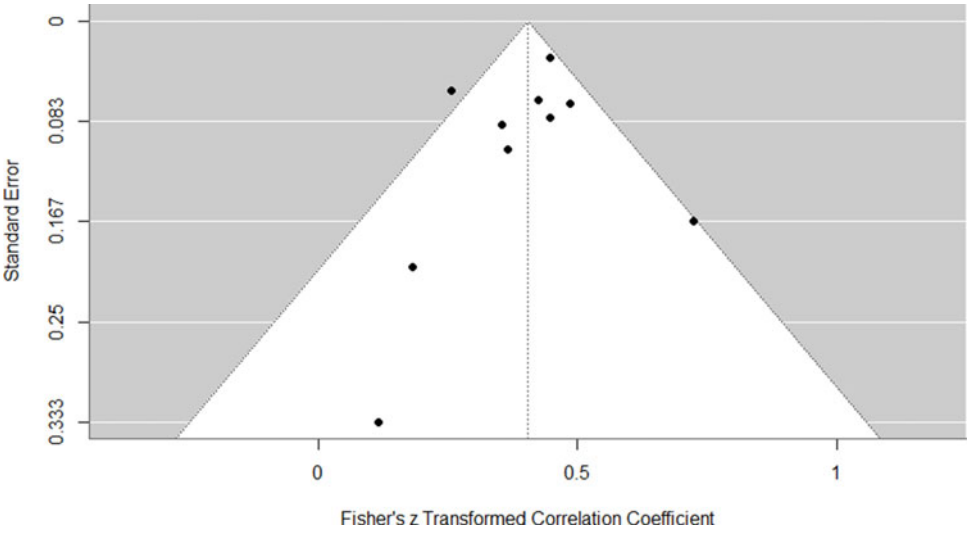


Figure 4. Funnel plot assessing publication bias in studies on the association between loneliness and hoarding.

Does loneliness cause hoarding?

Most studies had a cross-sectional correlational study design and did not provide any evidence regarding causality. Chen *et al.* (2023) and Weiss *et al.* (2020) were longitudinal pre- and post-treatment studies, but neither study included control groups and the interventions did not target loneliness. Only one study had an experimental study design (Yap *et al.*, 2024). The study aimed to evaluate whether improving loneliness reduced object attachment. Although they reported significant improvements in object attachment for a new item in the loneliness intervention group relative to the active control group, there were no significant improvements for other object attachment measures and hoarding. The authors noted that the loneliness intervention was only a brief online intervention and may have had an insufficiently strong effect on reducing loneliness.

Discussion

In this review, we aimed to clarify the association between hoarding and loneliness as previous literature suggested that they share important empirical and theoretical links, with loneliness proposed as both a cause and a consequence of hoarding. We asked three research questions: (1) how lonely are people with HD compared with clinical and healthy controls, (2) what is the strength of the association between loneliness and hoarding symptoms, and (3) what is the evidence that loneliness causes hoarding?

Results showed that people with HD were significantly more lonely than healthy controls. There was, however, mixed evidence about whether loneliness is heightened in HD compared with other clinical groups with one study showing significantly higher loneliness in the HD group and another showing no significant difference. Furthermore, the clinical group in these studies were people with OCD. It is unclear how loneliness in HD compares with disorders that are typically associated with loneliness and social isolation (e.g. depression and social anxiety). Considering previous research showing interpersonal conflict, high social isolation, and poor quality of life in people with HD (Nutley *et al.*, 2022; Tolin *et al.*, 2008), future research may find similar or even higher levels of loneliness when comparing HD with these disorders.

Although previous research indicated mixed findings regarding the association between loneliness and hoarding, our meta-analysis results showed a significant and moderately strong positive correlation. There were two studies with non-significant correlations (Chen *et al.*, 2023; Weiss *et al.*, 2020). Both studies showed small correlations that were not significant due to small sample sizes. Given that there were eight studies reporting positive associations, relatively low heterogeneity, and a low risk of publication bias, we are confident in the validity of this finding.

Our findings are consistent with observations that people with HD experience high levels of stigma and shame (Prosser *et al.*, 2024) and are more likely to be socially isolated due to difficulties in interpersonal functioning (Chen *et al.*, 2024; Grisham *et al.*, 2018). However, despite these promising initial findings, there is insufficient evidence to conclude that loneliness is a cause of hoarding, as is suggested by attachment theory (Mathes *et al.*, 2020; Yap and Grisham, 2021). There was only one study (Yap *et al.*, 2024) that examined a causal link and its findings were mixed. Further experimental and longitudinal research studies are needed to confirm whether loneliness causes more severe hoarding.

Limitations of included studies

While the quality of the research included in this review was generally high, with most studies having strong theoretical foundations, clear aims, and utilising appropriate research methods, we observed some limitations across the literature. Firstly, there was a critical lack of experimental or longitudinal research, with most studies conducting a cross-sectional analysis of hoarding and loneliness at one time point. Although we are confident that hoarding and loneliness share a moderate, positive association, this lacuna limits our ability to draw causal conclusions as we are unable to properly ascertain whether loneliness causes hoarding, hoarding causes loneliness, or whether they influence one another bi-directionally.

Secondly, we observed an over-reliance on analogue samples. While four studies recruited individuals who had been formally diagnosed with hoarding disorder, the majority of research included in this review relied upon undergraduate or crowdsourcing samples, with participants who were either unselected or had elevated scores on a hoarding symptom measure. Although findings using analogue samples have been found to generalise to clinically severe populations in other OCD-spectrum disorders (Abramowitz *et al.*, 2014), and hoarding traits are dimensional in the population (Timpano *et al.*, 2013), it is possible that the over-reliance on non-clinical samples in this review resulted in an under-estimation of the true association between hoarding and loneliness, as we might expect loneliness to be more elevated in clinically severe populations who

have been given a formal HD diagnosis. Hoarding behaviours can also ensue from conditions other than hoarding disorder, such as eating disorders (Novara *et al.*, 2016), dementia (Hwang *et al.*, 1998), and psychosis (Machado *et al.*, 2019), so without ratifying a formal diagnosis through a structured clinical interview, these studies are unable to rule out that the presence of other psychopathology is not muddying the hoarding–loneliness link.

Thirdly, we observed that several studies did not provide sufficient information about their recruitment processes (e.g. where they recruited from, how many were originally approached, and how many declined to participate). This is an important oversight to address, as there is evidence to suggest individuals who hoard are 'hard to reach' and those who choose to participate in hoarding research and treatment opportunities may differ in important ways from cases that come to community attention (i.e. more insight, more likely to be female, less clutter volume in the home; Woody *et al.*, 2020). Finally, there was a general lack of consumer/stakeholder co-design across the literature, with only one study showing sufficient evidence of this. Future research may seek to liaise with personnel who have lived experience of hoarding disorder to inform the appropriateness of their research methods (e.g. to determine which loneliness measure best reflects the HD experience; the UCLA-LS, INQ-TB, or DJGLS).

Limitations of the current review

Our systematic literature review included only peer-reviewed studies which may have led to a publication bias and an over-estimation of effects. Furthermore, while we did not exclude studies published in a non-English language, no non-English papers were included in this review. All included studies were therefore conducted in English-speaking countries with western, educated, industrialised, rich, and democratic (WEIRD) populations, which limits the cross-cultural validity of our findings. Finally, although we asked three research questions, we only conducted one meta-analysis that examined correlations between hoarding and loneliness. Due to the lack of studies, we did not conduct meta-analyses for the other research questions.

Implications and further research

Notwithstanding the limitations of the included studies and of our review, our results confirm that people with HD are likely to have high levels of chronic loneliness, and that those with more severe hoarding symptoms are lonelier. We suggest that clinicians working with HD assess loneliness and social isolation during their initial assessments and evaluate the impact of loneliness on hoarding and wellbeing over time. This may provide further insight into whether loneliness triggers hoarding behaviours for the individual. Given that loneliness has wide-ranging negative effects on psychological wellbeing and physical health, reducing loneliness should be a priority. As there are well-established evidence-based interventions for loneliness (Hickin *et al.*, 2021), we recommend integrating these interventions into the treatment of hoarding for HD clients who are lonely.

Gaining a better understanding of loneliness in HD is important with respect to informing theoretical models of hoarding and providing avenues to enhance treatment of this challenging disorder. While our review demonstrated a clear link between hoarding and loneliness, the causal direction is unclear. As hoarding is associated with interpersonal conflict and shame, it is probably a cause of greater loneliness. Whether loneliness in turn increases object attachment and hoarding as suggested by attachment theory is yet to be established.

Future longitudinal research should therefore investigate the positive feedback cycle in which loneliness/social isolation, insecure attachment and interpersonal difficulties drive a compensatory attachment to possessions that results in excessive clutter, which may then lead to further social isolation due to shame and impaired functioning. Cross-lagged panel studies where these variables are measured over several time points will allow for complex modelling of feedback loops and reciprocal causal relationships.

In addition, intensive longitudinal studies involving ecological momentary assessment (EMA) where data is collected several times a day over a shorter time frame (e.g. 2 weeks) will allow us to examine within-person variability, and to evaluate whether fluctuations in loneliness throughout the day have effects on object attachment, and whether social and interpersonal contexts play a role. Using idionomic methods, EMA can also provide an opportunity to examine whether the link between loneliness and hoarding applies to all people with hoarding symptoms or whether there are meaningful subgroups where loneliness affects hoarding to a greater or lesser extent (Ciarrochi *et al.*, 2024).

Experimental studies to examine the impact of loneliness on object attachment and hoarding symptoms in people with HD compared with active controls are also required. There are several experimental studies on the effects of social exclusion on object attachment and hoarding behaviours, but these studies were excluded from this review because of the lack of loneliness or hoarding measures (Chen *et al.*, 2017; Keefer *et al.*, 2012; Kwok *et al.*, 2018; Mathes and Schmidt, 2020; Norberg *et al.*, 2020). The findings of these studies were mixed and may not be relevant to hoarding because the experimental manipulations induced mild feelings of social exclusion with strangers and did not target chronic social exclusion from significant others. Furthermore, a ceiling effect is likely for people with HD who already have extremely high levels of chronic loneliness, thus limiting the applicability of this research paradigm. Therefore, instead of manipulating social exclusion, experimental studies to reduce chronic loneliness may be more relevant. Yap *et al.* (2024) provided some preliminary evidence of a causal link using such a design, but there were many study limitations including the use of an analogue sample, the lack of clinical assessments for the diagnosis of HD, and the use of a brief online loneliness intervention which had only small effects on loneliness. A randomised controlled trial of more intensive loneliness interventions that treat chronic loneliness in hoarding disorder patients is therefore needed.

Previous research has shown that loneliness has large effects on all health outcomes, with the largest effects on mental health and wellbeing, and is associated with all-cause mortality in older adults (Zhou *et al.*, 2023). We therefore recommend greater attention on addressing loneliness in the treatment of HD regardless of a causal link. One avenue for further research is to examine whether modifications to hoarding treatments can improve loneliness and wellbeing in addition to hoarding symptoms. Furthermore, including treatment components that address loneliness in hoarding treatment may indirectly lead to improved hoarding treatment outcomes by improving interpersonal relationships, mood, and emotion regulation. Initial pilot studies using transdiagnostic approaches that affect interpersonal factors have shown some promise and warrant larger scale randomised controlled trials (Chen *et al.*, 2023; Chou *et al.*, 2020).

Modifications to group interventions for hoarding to address loneliness also warrant further investigation. Currently, most group interventions for hoarding involve psychoeducation and cognitive behavioural strategies that specifically target hoarding behaviours. However, qualitative feedback from patients in group CBT for hoarding shows that social interaction is highly valued and beneficial (Chandler *et al.*, 2019; Schmalisch *et al.*, 2010). The group format provides opportunities for increased social contact in a safe and supportive environment, and re-designing group interventions to enhance social interactions, target loneliness, and reduce shame associated with hoarding may improve the effectiveness of hoarding treatments. The re-designing of interventions would benefit from qualitative research and co-design to ensure that it aligns with the lived experience of people with hoarding disorder who have high levels of loneliness. The re-design of group interventions is not limited to face-to-face interventions; online group interventions for hoarding using video teleconferencing have shown some promise, and research examining ways of directly targeting loneliness in these new formats is also warranted (Yap *et al.*, 2022).

Finally, research involving non-WEIRD populations is needed. Hoarding disorder has been identified in non-western countries and shows similar symptoms and core features (Jaisoorya *et al.*, 2020; Nordsletten *et al.*, 2018; Subramaniam *et al.*, 2020). Whether loneliness is associated

with hoarding across cultures is unknown. It may be that shame and social isolation due to hoarding in collectivistic cultures are more intense, which may then lead to higher levels of loneliness. Alternatively, greater social support in these societies could attenuate the impact of hoarding on loneliness.

Conclusion

There is a growing recognition of the importance of examining interpersonal factors associated with hoarding. This study is the first review of research into loneliness in hoarding disorder. We found that people with hoarding disorder experience significantly higher levels of loneliness compared with healthy controls but probably at similar levels as other severe psychological disorders. We also found a significant moderate correlation between hoarding and loneliness. These findings indicate that assessing and addressing loneliness in hoarding disorder patients is a priority. There was, however, insufficient evidence that loneliness causes more severe hoarding. Further research to examine the causal link is warranted.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/S1352465826101398

Data availability statement. The data supporting the findings of this study are derived from previously published studies cited in the article. Extracted data and analysis outputs are included in the article and its Supplementary material.

Acknowledgements. None.

Author contributions. **Keong Yap:** Conceptualization-Lead, Data curation-Lead, Formal analysis-Lead, Investigation-Lead, Methodology-Lead, Validation-Lead, Visualization-Lead, Writing - original draft-Lead, Writing - review & editing-Equal; **Isaac Sabel:** Conceptualization-Supporting, Formal analysis-Supporting, Investigation-Supporting, Methodology-Supporting, Visualization-Supporting, Writing - review & editing-Equal; **David Cooper:** Conceptualization-Supporting, Formal analysis-Supporting, Writing - review & editing-Equal; **Wenting Chen:** Conceptualization-Supporting, Formal analysis-Equal, Visualization-Supporting, Writing - review & editing-Equal; **Jessica Grisham:** Conceptualization-Supporting, Supervision-Lead, Writing - review & editing-Equal.

Financial support. This research received no specific grant from any funding agency, commercial or not-for-profit sectors.

Competing interests. The authors declare none.

Use of AI. The first author used ChatGPT-4o on 13 May 2025 for spelling and grammar checking, to improve the readability and language of some sections of the manuscript. After using this tool, he reviewed and edited the content as needed and takes full responsibility for the content of the published article.

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Cite this article: Yap K, Sabel I, Cooper DDJ, Chen W, and Grisham JR (2026). Loneliness in hoarding disorder: a systematic review and meta-analysis. *Behavioural and Cognitive Psychotherapy* 1–19. https://doi.org/10.1017/S1352465826101398