School of Psychology
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Hoarding Disorder in non-Western Cultures: A Systematic Review

and

Attachment to Self, Others, and Objects in Hoarding Disorder: An Empirical Investigation

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Table of Contents

Acknowledgements 5

Preface 6

Systematic Review *6*

Empirical Paper *6*

Title: Hoarding Disorder in non-Western Cultures: A Systematic Review 8

Introduction 10

Method 12

Analyses *16*

Results 17

Prevalence of HD *17*

Age of onset of HD *18*

Demographic profiles *23*

Gender/Sex 23

Living situation and location 24

Relationship and Marital Status *25*

Comorbidity *27*

Hoarding Behaviours *29*

Clutter 29

Excessive Acquisition 30

Difficulty Discarding 32

Objects Hoarded 33

Cognitions and beliefs in HD *34*

Impacts of Hoarding *38*

Predictors of HD *39*

Discussion 40

Strengths and Limitations *44*

Clinical and Research Implications *46*

References 49

Title: Attachment to the self, others, and objects in Hoarding Disorder: An Empirical Investigation 55

Abstract 56

Introduction 57

Cognitive Behavioural Model of Hoarding Disorder *57*

Attachment theory *59*

Attachment to others in Hoarding Disorder *60*

Attachment to self in Hoarding Disorder *62*

Object attachment in Hoarding Disorder *63*

Method 65

Design *65*

Participants *65*

Measures *66*

Independent variable measures 66

Clinical measures 67

Dependent variable measures 68

Procedure 69

Data analysis plan *69*

Results 70

Descriptive statistics *70*

Main analysis *73*

Discussion 75

Strengths and Limitations *78*

Clinical and Research Implications *80*

Conclusion *82*

References 83

Impact Statement and Commentary 90

Appendices 93

Appendix A: *93*

Appendix B: *94*

Appendix C: *101*

Appendix D *116*

Appendix E *117*

Hoarding Rating Scale Self-Report (HRS-SR; Tolin et al., 2010) 117

Obsessive-Compulsive Inventory – Revised (OCI-R; Foa et al., 1998) 118

Patient Health Questionnaire - 9 (PHQ-9; Kroenke, 2001). 119

Generalised Anxiety Disorder – 7 (GAD-7; Spitzer, 2006). 120

Relationship Scales Questionnaire (RSQ; Griffin & Bartholomew, 1994) 121

Reciprocal Attachment Questionnaire – Adapted 123

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Preface

Systematic Review

Hoarding disorder (HD) is present in countries across the world. The majority of research into hoarding disorder has taken place in Western cultures, but there is a lack of research into its prevalence and presentation it in non-Western cultures. The purpose of this report is to review the existing literature exploring HD in non-Western countries to identify similarities and differences in the presentation of HD across the world. A systematic search was used using online databases and identified eleven eligible studies. The studies included people who were diagnosed with HD or were assessed using a validated measure of HD. HD was reported in seven non-Western countries (Japan, China, Hong Kong, Singapore, Brazil, India, and Turkey). Types of objects hoarded, demographics, symptoms of HD, comorbidities and predictors of HD exhibited differences across cultures. Even though there are differences, it is clear that HD is a valid diagnosis in non-Western cultures, and further research is needed to explore the similarities and differences further, to establish the role that culture plays in HD.

Empirical Paper

People with Hoarding Disorder (HD) show a higher level of attachment to their objects, and experience greater difficulty discarding these objects compared to healthy controls. They also are more likely to experience secure relationships which may affect their ability to form healthy relationships with others and with themselves. This study aimed to find out more about the role of the relationship to the self, relationships with others, and attachment to objects in people with HD compared to people with obsessive-compulsive disorder (OCD) and those without any mental health issues (Controls). Participants completed questionnaires using online data collection software and allocated to one of the

three groups (HD, OCD, or Control). The results showed that people with HD and people with OCD had more difficulties with their relationship with themselves and with others compared to the control group. People with HD were especially attached to objects compared to the other groups. However, there were no significant differences between people with HD and people with OCD when it came to their relationship with themselves or with others. These findings tell us that people with HD have a stronger attachment to objects compared to people with OCD or controls. The study helps us understand more about the role of relationships in hoarding disorder and discusses future possibilities for treatment.

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Abstract

Hoarding disorder (HD) is recognised as a universal disorder, with evidence of HD found across cultures (e.g., Fernandez de la Cruz et al., 2016). Whilst research on HD has been increasing, the literature is limited when exploring HD specifically in non-Western cultures. The purpose of this review is to investigate and summarise the studies that explore HD in non-Western cultures, evaluate the findings, and consider future directions for research into HD across the world. Using PRISMA guidelines, a systematic literature review was conducted. Eleven studies investigating HD in non-Western cultures were identified, consisting of ten quantitative studies and one qualitative study. Participants were aged 17 or over, had a clinical diagnosis of HD or were assessed using standardised measures of HD. HD was investigated across seven different non-Western cultures, with varying levels of prevalence. Demographic characteristics, types of objects hoarded, symptoms of HD, comorbidities, and predictors of HD exhibited differences across cultures. The results are discussed in relation to these findings. HD is prevalent across the world and may manifest in nuanced ways influenced by cultural factors. Overall, HD appears to be a condition that presents similarly across countries and is a valid diagnosis in non-Western cultures. Further research is required to explore these nuances and the role culture plays in HD.

Introduction

Hoarding Disorder (HD) is characterised by excessive acquisition of objects, difficulty discarding possessions which has a significant negative effect on an individual's living space and quality of life (Diagnostic and Statistical Manual for Mental Disorders, 5th ed.; DSM-5, American Psychiatric Association [APA], 2013). Hoarding often causes significant distress for the individual, in addition to their family and wider community. Reports of hoarding symptoms can be found across most parts of the world, including South Africa, Asia, and South America (Cramer & Vols, 2016; Timpano et al., 2015; Fontenelle et al., 2010). Whilst there is limited accurate data of a worldwide prevalence, a review and meta-analysis conducted by Postlethwaite et al. (2019) found prevalence rates ranging from 0.8% in Sweden, to 6.03% in Italy.

The majority of research on HD has focused on Western cultures such as North America, United Kingdom, Italy, Spain, and Germany (Postlethwaite et al., 2019). This research, although positive, may miss the culture-specific characteristics of HD which may be protective or act as risk factors for HD. It is therefore important to examine HD in non-Western cultures to establish a better understanding of the influences and contributors to the development of HD and identify possible variations in the presentation of HD in these populations. Nordsletten et al. (2013) reported that among those diagnosed with HD, 23.4% were White and 11.8% were from other ethnic backgrounds, suggesting a lower rate of HD among other ethnicities. However, these findings were incidental and not the primary focus of exploration. Therefore, it is difficult to conclude accurate prevalence data for non-Western cultures, especially as these studies are conducted in the West. Rodriguez et al. (2013), found that Native/American or US-born individuals had more difficulty discarding worn-out/worthless items, compared to Black, Asian, or Hispanic individuals. These findings indicate that ethnicity or culture may play a role in HD. As the DSM-5 is primarily developed

using Western standards for use in Western countries, the validity of an HD diagnosis may differ in countries such as India, China, and Japan. This has created the need for valid measures of HD to include and adapt to possible cultural variations in HD.

There have been examples of successfully validated HD and saving behaviour measures in other cultures and languages, for example the Savings Inventory-Revised (SI-R; Frost, 2004) has been translated into Chinese (Lee et al., 2016), Iranian (Mohammadzadeh, 2009), and Portuguese (Fontenelle et al., 2010). The Hoarding Rating Scale (HRS) has also been translated into Japanese (Tsuchiyagaito et al., 2017). It has been suggested that culture-specific characteristics can act as both risk factors and protective factors, suggesting that vulnerabilities in one culture may not translate directly to others (Fernandez de la Cruz et al., 2016). In a study comparing Chinese university students to American students (Timpano et al., 2015), scores on the SI-R and a novel Savings Belief Questionnaire (SBQ) were used to explore differences in hoarding behaviour. The SBQ was comprised of 14 items exploring a range of attitudes and beliefs associated with HD (based on the Saving Cognitions Inventory). The SBQ included the original categories of the SCI (emotional attachment, responsibility, control, fear of loss), along with additional domains believed to be relevant to hoarding in Chinese culture. Overall, their findings suggest that culture-specific factors may influence hoarding symptoms, and that different measures may be needed to capture hoarding in diverse cultural contexts. It is important to establish whether there are cultural differences in HD as this may have an influence on both the development and treatment of HD across cultures as Western conceptualisations and interventions may not translate directly to other cultures.

Although HD appears to be present globally, it is likely that the factors influencing HD may vary in different cultures based on factors such as cultural beliefs, attitudes towards material possessions, and access to resources. For example, hoarding behaviour may be more

accepted in some non-Western cultures, where collecting and preserving objects with sentimental value is a common cultural practice. In such cultures, HD may not be recognized as a mental health condition but rather as an extreme form of this cultural behaviour. Another possibility is within Western cultures, where consumerism and individualism are more prominent, HD may be influenced by excessive acquisition of objects. Whereas in cultures where community and collectivism are valued, acquisition of large quantities of objects may be more socially acceptable. Socioeconomic factors such as poverty, limited access to resources, attitudes towards frugality and environmental conservation may contribute to acquisition and hoarding behaviours. In East Asia, where attitudes towards re-use and recycling may be more prevalent, collecting behaviours may not be perceived as problematic due to this being an accepted and expected way of living. Developing an understanding of HD in non-Western cultures is important for developing culturally sensitive interventions. This review aims to explore the existing literature on HD in non-Western cultures to provide a comprehensive understanding of this disorder across diverse cultural contexts. Within this, the review aims to summarise the existing knowledge of HD in non-Western cultures in a sensitive and culturally appropriate way. Cultural differences found may also be useful in exploring cultural similarities and differences in mental health conditions beyond HD.

Method

The review was registered on Prospero [CRD42022303692] on 6th April 2022, with final amendments accepted on 16th January 2023. PRISMA guidelines (Page et al., 2020) were utilised to ensure robustness of the systematic review method. Searches were completed by the end of January 2023 and the following databases were used: PsycINFO, MEDLINE, EMBase and PubMed. Searches included "*hoarding", "culture", "western", and "eastern"*. The full list of search terms is included in Appendix A. Searches were repeated in May 2023 to cover recently published articles, with no relevant articles found. Additionally, reference

lists of included studies were examined to identify other possible eligible papers. The PRISMA flow diagram is displayed in Figure 1. Study inclusion criteria are displayed in Table 1. Papers exploring hoarding behaviour in relation to the COVID-19 pandemic were excluded. This was due to the context of COVID-19 creating a shortage of certain products, and therefore the motivators for hoarding behaviour were external and linked to stockpiling of supplies. The duration of hoarding behaviour is also likely to be short-term within the context of a pandemic and therefore not a chronic, life-limiting disorder. Two were excluded for this reason but they also did not meet other inclusion criteria: Tse et al. (2021) did not use a validated measure of HD, and Banerjee (2020) was not an empirical paper. One non-English language paper was excluded at the title/abstract screening stage. This paper provided a translated abstract (translated into English), and it was not clear whether this paper used a validated measure of HD (Lu, 2020). The paper was also not accessible for translation (i.e., inaccessible via online methods), and was therefore excluded from the review for not meeting two of the inclusion criteria (non-English language and non-validated measure of HD).

Figure 1:

PRISMA flow diagram

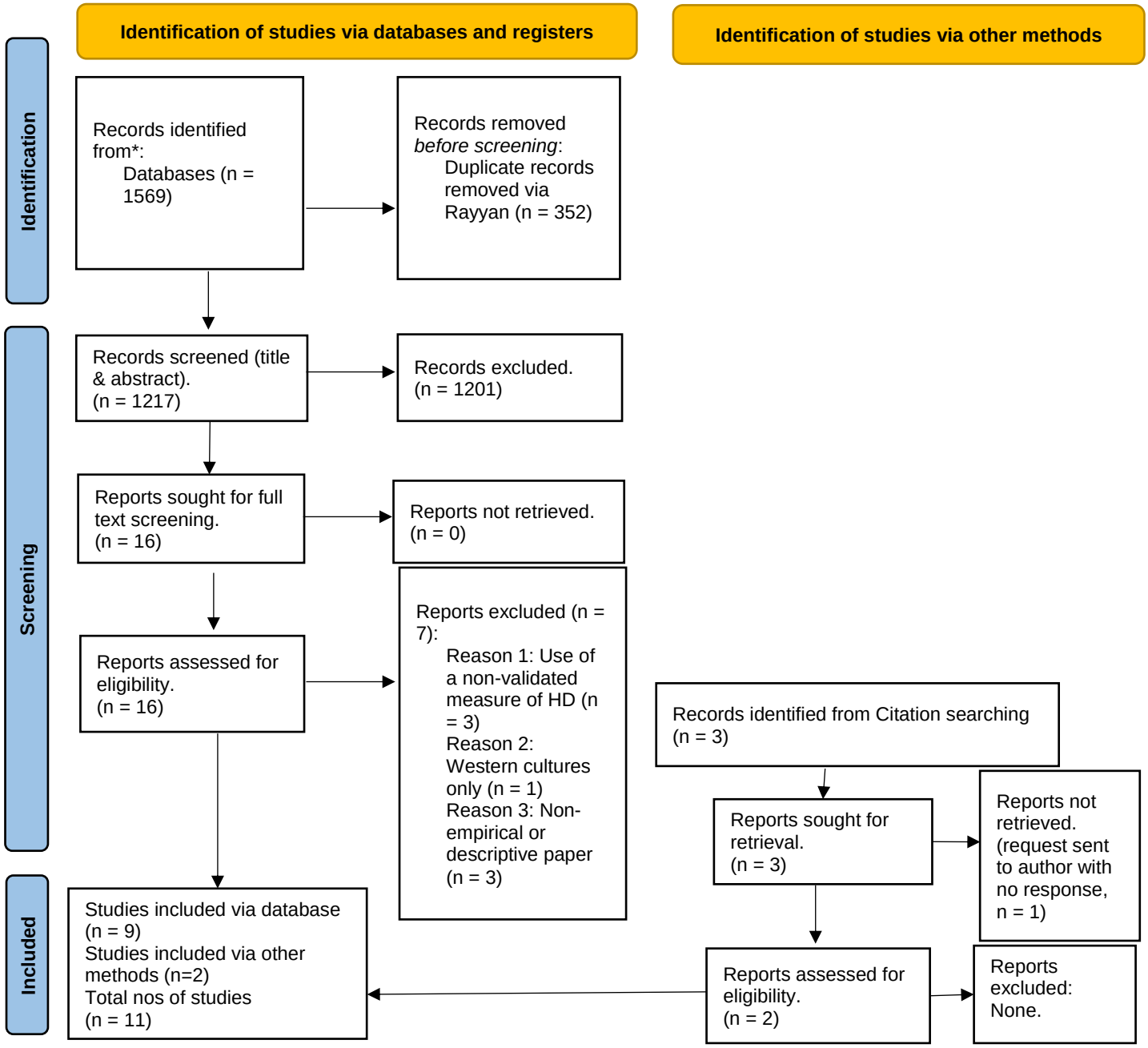

Table 1:

Inclusion criteria for database search

	Inclusion criteria	Exclusion criteria
Study type	Peer reviewed journal articles. English language. Including studies on Diogenes Syndrome. Cross-sectional/experimental design. Qualitative and quantitative design.	Animal hoarding studies. Excluding narrative descriptive and reviews. Studies not written or translated into English. Non-research articles, e.g., books, book chapters, review papers, conference abstracts or posters.
Participants	>17 years old* Diagnosed with HD using a validated HD measure (e.g., SI-R, HRS, or detailed clinical interview)**.** Papers must include participants from a non-Western culture.	Sole focus on Western populations. <17 years old*. Diagnosis of dementia, intellectual disability, or other neuropsychological condition.
Intervention	Studies were not required to have reported on interventions	

**Inclusion/Exclusion criteria changed from ≥ 18 to 17 years at full text screening.*

The author reviewed titles and abstracts of 1217 papers. An independent Clinical Psychologist screened 10% (*n* = 121). Initially, five papers had discrepancies, rated as 'maybe' by the independent rater. After discussion, it was decided these papers did not meet inclusion criteria for the review as the papers were not exploring HD in non-Western cultures. Texts that required a full review (n = 18) were discussed with the research supervisor as to the suitability of the paper in relation to inclusion and exclusion criteria and the study question. Three papers were identified from reference lists of relevant papers of which two were included in the review. Eleven papers met inclusion criteria and were included in the present review. All papers (n = 11) were independently rated by a Clinical Psychologist against inclusion and exclusion criteria; no disagreements were noted. Included papers were reviewed for quality using the Mixed Method Appraisal Tool (MMAT; Hong et

al., 2018). The included papers were rated using the MMAT by an independent rater (Clinical Psychologist) with good inter-rater reliability (Cohen's Kappa = .82). Full ratings for the MMAT by the author are displayed in Appendix B. The MMAT does not recommend using numerical scoring for rating of papers (Hong et al., 2018), so a summary is provided below.

Six papers were rated highly by both raters on the MMAT (Ye et al., 2021; Subramaniam et al., 2020; Nordsletten et al., 2018; Ong et al., 2016; He et al., 2021; & Kuwano et al., 2020). That is, no concerns were raised over methodological issues in these papers. Five papers, therefore, had some issues around study design (Chakraborty et al., 2012; Matsunaga et al., 2012; Timpano et al., 2015; Yorulmaz & Demirhan, 2015; & Xu et al., 2015). Chakraborty et al. (2012), Matsunaga et al. (2012), Yorulmaz and Demihran (2015) and Xu et al. (2015) were highlighted for concerns regarding nonresponse bias of participants. For example, Xu et al. (2015) did not elaborate on why some participants did not complete the research, and participants in Chakraborty et al. (2012) who were unable to take part may have done so for reasons that were pertinent to the variables of interest.

Participant samples were another common reason why papers were not rated highly. For example, Timpano et al. (2015) and Xu et al. (2015) recruited only students for their samples, meaning that the findings from these studies cannot be generalised further than the student population in China. In Turkey, Yorulmaz and Demirhan (2015) recruited participants from workplaces, meaning only employed adults took part. This limits the findings to adults in employment within the Turkish population.

Analyses

Due to the heterogeneity of the included studies a narrative synthesis was conducted. This approach allows the use of words to summarise and synthesise the results of each paper

to explain the findings (Popay et al., 2006). Therefore, this review drew together the included studies and explored the relationship between the data, quality of research and methodological limitations in order to understand the role of culture in HD.

Results

A total of eleven studies, with *n* = 10,665 were included in the review. One qualitative paper was included (Ong et al., 2016), with the remainder being quantitative studies. An overview of the study characteristics is presented in Table 2.

Prevalence of HD

Three studies reported prevalence of HD in clinical populations (Chakraborty et al., 2012; Matsunaga et al., 2012; Ong et al., 2016). Ye et al., (2021), He et al., (2021), Timpano et al. (2015), Yorulmaz and Demirhan (2015), and Xu et al. (2015) did not report prevalence for HD behaviours in their samples. These papers used designs that could not establish or estimate the prevalence of HD in their respective countries (e.g., correlational designs). Subramaniam et al. (2019), Nordsletten et al. (2018), and Kuwano et al. (2020) recruited participants with a diagnosis of HD for their research. Prevalence of HD in the corresponding countries were therefore not reported.

The prevalence of HD within different clinical populations varied greatly. For example, in an Indian sample of OCD outpatients an HD prevalence of 10% was reported (Chakraborty et al., 2012), whereas in Japan, 32% of the OCD sample had HD (Matsunaga et al., 2012), and 30% in a treatment seeking outpatient sample in Singapore (Ong et al., 2016). Indian and Japanese samples underwent a detailed clinical interview conducted by mental health professionals, which would allow for more in-depth assessment of hoarding behaviours. However, in Chakraborty et al., (2012) and Matsunaga et al. (2012), there were a number of participants that did not complete the study and reasons for this are not reported.

Participants such as this may have been unable to complete the study for reasons that may be pertinent to the prevalence rates reported in these studies and would benefit from further elaboration in these two papers.

Additionally, psychometric assessment methods differed between the samples, with Chakraborty et al. (2012) using the well-validated SI-R, whereas Matsunaga et al. (2012) used a semi-structured interview, which may provide additional insight into the nature of difference between the two samples. The study including a sample from Singapore (Ong et al., 2016) utilised three well-validated measures (SI-R, SCI, Clutter Image Rating (CIR)).

Age of onset of HD

Five studies reported age of HD onset (Nordsletten et al., 2018; Matsunaga et al., 2012; Kuwano et al., 2020; Chakraborty et al., 2012; Subramaniam et al., 2020), with little difference reported across countries. However, specific aspects of HD such as difficulty discarding, and clutter showed variations. Nordsletten et al. (2018) found no significant differences in age of onset of many HD symptoms across UK, Brazil, Japan, and Spain samples. However, the onset of difficulty discarding items was found to be later in life in Brazil (mean = 33.7, SD = 14.58), compared to Japan (mean = 16.6, SD = 17.33), UK (mean = 15.45, SD = 6.44) and Spain (mean = 20.19, SD = 11.48). Later onset of levels of clutter were also found in Brazil (mean = 33.73, SD = 14.58) compared to the UK (mean = 22.4, SD = 7.51). Age of onset for clutter was not reported in Japan or Spain, therefore, the inconsistent data in this paper makes it difficult to compare the age of onset for specific symptoms of HD in different cultures. In other studies investigating the age of onset of HD in Japanese populations, Matsunaga et al., (2012) reported a mean age of onset of 21 years (SD = 6.7) for all HD symptoms, whereas Kuwano et al. (2020) reported a median age of onset as 14 years. In both papers from Japan, participants included treatment seeking outpatients who may have records and detailed assessment from when symptoms began or became a problem

for participants which could provide more information compared to those who are community-based with no historical records. Kuwano et al. (2020) also recruited from the general public using adverts in a local mental health institution's newspaper. This difference in sample may reflect the differences in age of onset, where participants recruited using advertisements may differ from those in an outpatient service. In an Indian sample (Chakraborty et al., 2012), age of onset for OCD was reported instead of onset of HD symptoms. However, all participants in the HD group sought support for OCD symptoms, and through further assessment, were found to have HD as their primary problem (age of onset was not significantly different between the OCD and HD groups). Subramaniam et al. (2020) reported a mean age of onset in a Singaporean sample to be 43.9 years (SD = 22.28, range 12 – 75 years).

These results paint a picture of the ages of onset across diverse cultures and samples. Age of onset for East Asian countries (e.g., Japan) appears to be much earlier in life compared to those in South Asian countries (e.g., India), and South America (e.g., Brazil).

Table 2: Demographics and study information from included papers.

Authors	Country	N		Mean age *(SD)*	Gender *(%)*		Study type	Results
					Male	**Female**		
Ye et al. (2021)	China & Hong Kong	2439 (total)		NR *(range = 18-59)*	1166 *(47.8%)*	1273 *(52.2%)*	Correlational study exploring the relationship between Compulsive Buying Behaviour (CBB) and HD across three age groups of the general population	CBB is related to HD and varies across different stages of adulthood
Chakraborty et al. (2012)	India	HD	20	31.05 *(9.28)*	10 * *(50%)*	10* *(50%)*	Comparison of HD with non-HD OCD participants	10% of OCD participants had HD, unrelated to OCD. Higher levels of comorbidity in HD.
		NHD	180	29.85 *(10.53)*	96* *(53%)*	84* *(47%)*		
Matsunaga et al. (2012)	Japan	HD	54	30.8 *(8.9)*	24	*30*	Comparison of clinical features between HD and non-HD (OCD) participants recruited from an outpatient clinic	Clinical characteristics of HD in OCD is similar to Western countries. High prevalence of comorbid Axis II disorders and poorer insight in HD group.
		NHD	114	30.1 *(8.8)*	34	80		
Subramaniam et al. (2020)	Singapore	12		56.67 *(14.47)*	5 *(41.67%)*	7 *(58.33%)*	Thematic Analysis of interviews exploring experiences of those with HD	HD linked to serious impairment of functioning and social impairment, compounded by a lack of insight into HD symptoms.
Nordsletten et al. (2018)	UK, Brazil, Japan, Spain	82		43.64[a] *(20.57)*	41 *(50%)*	41 *(50%)*	Comparison of clinical characteristics of	HD behaviours largely stable across cultures. Differences in age, marital status and

						participants with HD across four countries.	clinical expression were noted.
Ong et al. (2016)	Singapore	500	35.3 *(10.1)*	282 *(56.4%)*	218 *(43.6%)*	Exploration of HD in sample of participants recruited from outpatient services	Found 30% of clinical outpatients had HD. Low levels of clutter and HD symptoms were not related to QOL. Depression was a predictor of HD severity.
He et al. (2021)	Hong Kong & China	1274	NR	610 *(47.9%)*	664 *(52.1%)*	Correlational study comparing CBB and HD behaviours in general population	Significant correlation between CBB and HD in a community sample.
Timpano et al. (2015)	China	1828	20.6 *(1.2)*	651 *(35.6%)*	1177 *(64.4%)*	Factor Analysis of Chinese SIR & Comparison to USA sample of university students	Hoarding beliefs in China may be centred on themes of usefulness and wastefulness compared to a US sample.
	USA	87	19.18 *(2.4)*	28 *(32.2%)*	59 *(67.8%)*		
Yorulmaz & Demirhan (2015)	Turkey	775	32.32 *(8.49)*	419 *(54.1%)*	332 *(42.8%)*	Exploration of cognitive correlates of HD recruited from the community.	Indecisiveness, emotional attachment to belongings, positive and negative beliefs about worry, and cognitive confidence play a role in HD. Indirect ways of coping such as escape/avoidance, belief in supernatural forces, accepting responsibility, keeping to self and less use of planned problem solving were associated with HD
				NR = 24 *(3.1%)*			

Kuwano et al. (2020)	Japan	HD	30	42.7 *(12.6)*	8 *(26.7%)*	22 *(73.3%)*	Exploration of clinical characteristics in HD compared to OCD and controls.	HD group showed higher family rates of HD, earlier onset, and longer duration than OCD group. Top comorbidities for HD were MDD & ADHD. Lower functioning in HD group.
		OCD	20	44.5 *(10.6)*	7 *(35%)*	13 *(65%)*		
		Control	21	44.5 *(8.1)*	8 *(38.1%)*	13 *(61.9%)*		
Xu et al. (2015)	China	3229		20.5 *(1.60)*	1839*	1334*	Exploration of the relationship between HD and autistic traits using a sample of university students	Autistic traits were significantly positively correlated to HD symptoms, mediated by anxiety and depression.
					NR = 56			

[a] *Combined Means based on reported data. Calculated using https://www.statstodo.com/CombineMeansSDs.php.*

**Article reported biological sex of participants.*

Demographic profiles

Gender/Sex

Gender/sex characteristics are presented in Table 2 and were reported in nine papers for their total samples. Two papers reported biological sex (Chakraborty et al., 2012 and Xu et al., 2015). Seven papers reported gender (Ye et al., 2021; Matsunaga et al., 2012; Subramaniam et al., 2020; Nordsletten et al., 2018; He et al., 2021; Kuwano et al., 2020 and Yorulmaz & Demirhan, 2015). Two papers (Timpano et al., 2015 and Ong et al., 2016) did not state gender, biological sex, or otherwise, but reported binary identities (male or female) in their results. Two papers (Yorulmaz & Demirhan, 2015 and Zu et al., 2015) both had a percentage of their sample who did not report their gender identity. This may be due data collection methods that do not allow for participants who identify as non-binary (or a gender other than their biological sex), to report their preferred answers.

In Japan and Singapore, the majority of HD participants identified as female, according to several studies (Nordsletten et al., 2018; Matsunaga et al., 2012; Kuwano et al., 2020). However, there were no significant gender differences found between the HD and OCD groups in any of these studies. In a larger sample of Singaporean participants, there was a higher ratio of males to females in their HD group (Ong et al., 2016), comparable to the 60% of male participants in a Brazilian sample (Nordsletten et al., 2018). Chakraborty et al. (2012) reported an even split of males and females in the HD group (n = 20). Yorulmaz and Demirhan (2015) found no differences in terms of gender/sex, education level and hoarding symptoms ($t = 1.30$, $p > .05$). Xu et al. (2015) reported that females are more likely to display hoarding behaviours compared to males in a non-clinical community sample ($p < .001$).

Gender differences across cultures can vary based on sample sizes and sampling methods, though overall there appears to be an equal number of males and females that experience HD symptoms in these samples. However, the papers included in the review are

limited in reporting in depth demographics and do not explore the role of gender in HD. Demographic information collected on gender or biological sex as binary may lead to exclusion of those who identify as non-binary or identify as different to their biological sex. Two papers in this review had a proportion of participants who did not report their gender or biological sex, which may miss important differences when conducting exploratory research.

Living situation and location

Four studies reported on living situation, for example whether participants lived alone, or in rural or urban areas (Nordsletten et al, 2018; Kuwano et al., 2020; Chakraborty et al., 2102; Ong et al., 2016). Seven studies did not collect this information for HD groups (Ye et al., 2021; Matsunaga et al., 2012; Subramaniam et al., 2020; He et al., 2021; Timpano et al., 2015; Yorulmaz & Demirhan, 2015; Xu et al., 2015)

In Brazil, 20% of participants lived alone (Nordsletten et al., 2018). Japanese samples had varying percentages, ranging from 23.53% (Nordsletten et al., 2018) to 33.3% (Kuwano et al., 2020). This is significantly lower than the UK (72.4%), but higher than Spain (9.5%; Nordsletten et al. (2018)). Similarly, Ong et al., (2016) reported that 86.3% of those with HD were living with family members and/or their spouse at the time of the study. The authors suggest that this may be linked to the collectivist nature of Singaporean culture, where it is more common to live with family into adulthood. These findings suggest that whilst there may be lower levels of participants living alone in non-Western cultures, these differences may be due to cultural factors such as norms around leaving home and caring for family. In a Japanese sample, there were no significant differences in the number of participants living alone between their HD group, OCD group, or healthy control group which may suggest that in Japan, HD is not influenced by living alone or living with others (Kuwano et al., 2020), suggesting there may be more nuanced differences between Japan and Singapore in the living situation of participants.

Chakraborty et al., (2012) was the only paper to report on the location of participants (e.g., rural, urban). The reported that all participants in their HD group lived in urban areas compared to their non-hoarding group, where 83% lived in an urban area, a statistically significant difference. This difference may be due to the nature of participant recruitment in this study, where an outpatient centre in Bangalore was used as the recruitment base. Participants from rural areas in India may be less likely to engage in research based within a city, whereas those who have the means to attend the centre are more likely to live in or around Bangalore itself which could inevitably lead to this discrepancy.

Relationship and Marital Status

Ye et al. (2021), He et al. (2021), Yorulmaz & Demirhan (2015), Xu et al. (2015), Ong et al. (2016) and Timpano et al. (2015) did not report relationship status for their samples. Nordsletten et al. (2018), Matsunaga et al. (2012), Kuwano et al. (2020), Subramaniam et al. (2020) and Chakraborty et al. (2012) reported on marital status for their samples. Marital status varied between participant samples across studies. Nordsletten et al., (2018) reported that in both Brazil and Japan, 47% were married. Nordsletten et al. (2018) suggest that cultural norms, such as acceptance of divorce, may contribute to these differences, as the percentage of married individuals was higher in the Spanish, Brazilian, and Japanese samples (66.7%, 47%, and 46.7% respectively) compared to the UK (13.8%). Matsunaga et al., (2012) reported 31.4% of HD participants in Japan were married, whilst 3.7% were divorced. No differences were noted between primary (hoarding as main problem) and secondary (hoarding as secondary to another mental health problem) hoarders in the proportion of married to single participants. In Kuwano et al. (2020), the number of unmarried participants did not differ significantly between the HD (63.3%) and OCD (65%) groups, but both were significantly different from the healthy control group (33.3%) in Japan. No age differences were found between these groups, which may have accounted for the discrepancy between

marriage rates between groups. In Singapore, a qualitative study of 12 participants with HD reported 41.7% of participants were married, with 16.6% being divorced (Subramaniam et al., 2020). Chakraborty et al. (2012) reported 55% single participants in the HD group, alongside 45% married. Compared to 56% single, 42% married and 3% separated in the non-HD group. These differences were not statistically significant (p = .739).

The higher rates of marriage in non-Western cultures may be accounted for by divorce being more accepted in Western cultures, as hypothesised by Nordsletten et al. (2018). It is worth noting that that the included papers reported marital status, and did not explore whether participants were cohabiting, or in long term relationships but not married which may influence the validity of these findings.

Occupation, income, and education level

Data for participant occupation and education were not widely recorded for HD groups. Twenty per-cent of those with HD in India were unemployed (Chakraborty et al., 2012), compared to 41.7% in Singapore (Subramaniam et al., 2020). For the level of education in HD, Subramaniam et al. (2020) reported that 41.7% of their participants had completed secondary school, and 33.3% having completed a university degree. Yorulmaz and Demirhan (2015) did not find any significant correlations between HD severity and demographic information (education level, gender, and marital status) in a Turkish population which suggests that HD is not confined to a particular demographic in this Turkish sample. However, this paper did recruit participants who were in employment (recruited through employers), therefore, results cannot be extrapolated from this population to the general population of Turkey.

Comorbidity

Five papers in this review reported rates of comorbidity with a number of psychological disorders (Nordsletten et al., 2018; Subramaniam et al., 2020; Chakraborty et al., 2012; Ong et al., 2016; Matsunaga et al., 2012). When exploring the presence of any Axis-I disorder, Nordsletten et al. (2018) reported that 100% of Brazilian participants who recorded responses (n = 11) had a comorbid Axis I disorder, including a significantly higher rate of OCD compared to Japan, UK, and Spain. In an Indian sample, hoarders were more likely to have attempted suicide in their lifetime compared to non-hoarders ($p < .001$; Chakraborty et al., 2012). In addition to lifetime suicide attempts, the HD group were more likely to experience major depressive disorder ($p = .002$), suicidality ($p = .038$), bipolar disorder ($p = .01$), and generalised anxiety disorder (GAD; $p = .009$). Ong et al. (2016), in Singapore, found significant differences between their HD and non-HD groups for anxiety and depression, both at the $p < .001$ significance level, reporting a medium effect size for both measures ($d = .60$ and .72 respectively). Conversely, findings for levels of anxiety were not replicated in the Japanese samples in Matsunaga et al. (2012) and Kuwano et al. (2020), with no significant difference between their HD groups and non-HD group. Discrepancies in data such as this may arise from cultural differences between Japan and Singapore, but may also be due to measurement differences or sample characteristics that can influence the interpretation of results. All three papers recruited participants from outpatient services, whereas only the two papers from Japan (Kuwano et al., 2020 and Matsunaga et al., 2012) used detailed interview methods using either DSM-IV or DSM-5 criteria. Anxiety in Ong et al. (2016) was measured using self-report methods which allows room for response bias when participating. Differences observed, therefore, may be explained by variations in measures as opposed to cultural characteristics. Nordsletten et al. (2018) reported a significantly higher

level of GAD in their Brazilian and UK HD samples, compared to Japan and Spain (both n = 0).

For Axis II disorders, those in the HD group in Chakraborty et al., 2012 were more likely to present with depressive, anxious avoidant, dependent, and obsessive-compulsive personality disorder symptoms (all $p < .01$). However, sample size difference was notably large between the HD group (n = 20) and non-HD group (n = 180) which may limit the scope of interpretation for these findings. Significant differences were also found between groups in a Japanese sample (Matsunaga et al., 2012), with the HD group having a higher prevalence of Cluster A, Schizotypal, and Obsessive-compulsive personality disorder (OCPD; all $p < .05$), though a large group difference is still present (HD n = 54, NHD n = 114).

One study explored comorbid Attention-deficit hyperactivity disorder (ADHD) in Japan (Kuwano et al., 2020) and another explored comorbid autism in China (Xu et al., 2015). In Kuwano et al. (2020), ADHD was significantly positively associated with HD compared to an OCD group ($p = .02$) in addition to "pervasive developmental disorders" ($p = .07$). Xu et al. (2015), in China, explored the relationship between autistic traits and the mediating role of anxiety and depression in HD. They observed that within a non-clinical community sample, traits of autism (using a self-report measure) were significantly correlated to hoarding behaviour, alongside anxiety and depression (all significant at $p < .001$). These two studies suggest there may be a role of neurodevelopmental disorders in HD in East-Asian countries, which as yet has had limited attention.

Diagnostic interviews were conducted in most studies to obtain information, but there is a risk of subjectivity due to the nuances of language and differences in reporting personal experiences. This can lead to variations in diagnoses between countries, such as the prevalence of Axis II disorders in Japan versus Axis I disorders in Brazil. Despite this, it is

clear that HD has high levels of comorbidity across various non-Western cultures. Results reported on rates of comorbidity may also be influenced by study designs, with Chakraborty et al. (2012) having 45 participants not completing the study. As this study recruited participants from an outpatient clinic, there may be factors influencing their decision to withdraw from the study which may be of interest, especially when exploring levels of comorbidity. Similarly, Ong et al. (2016) and Xu et al. (2015) relied heavily on self-report measures which may increase the risk of social desirability bias.

Hoarding Behaviours

Clutter

Five papers explored levels of Clutter (Nordsletten et al., 2015; Matsunaga et al., 2012; Subramaniam et al., 2020; Ong et al., 2016; Timpano et al., 2015). In the Brazilian sample in Nordsletten et al. (2018), participants reported significantly less clutter in their homes, compared to the Japanese sample on the HRS. These self-reported observations were supported by the results of the clinician reported Clutter Image Rating (CIR) which found significantly lower levels of clutter within the Brazilian sample, strengthening the reliability of this finding. In a Japanese sample, Matsunaga et al. (2012) reported the levels of clutter filled at least one room in participants' houses. This finding complements the findings from Nordsletten et al. (2018), which found the highest scores of clutter on the HRS for the Japanese sample, with 84.6% having clutter that was present in most of their living space.

In a qualitative study conducted by Subramaniam et al. (2020) in Singapore, twelve participants were interviewed about their experiences of living with HD. Ten out of the twelve participants reported storing their possessions in cupboards, on tables, the floor of the living room, a common corridor and all over the house. Ten participants stored their possessions in an unorganised way, using descriptors such as "*messy, piled up, disorganised, obstructing the path, untidily"*, whereas two participants reported storing items in an

organised way (Subramaniam et al., 2020, p. 459). Another study of HD in a Singaporean population (Ong et al., 2016), reported a positive relationship between levels of clutter measured by the Clutter Image Rating and functional impairment due to clutter ($r = .48$, $p < .001$). In a Chinese study which compared HD in Chinese and US samples (Timpano et al., 2015), it was found that levels of clutter were significantly higher in the Chinese sample compared to the US sample ($p < .001$).

The level of clutter, therefore, appears to be more severe in East Asian samples compared to South American and European samples based on these findings. This may be partly explained by environmental factors, such as the Japanese participants living in accommodation with fewer rooms, and therefore less space to store accumulated items. Similarly, in Singapore, it appears that participants were living in apartment blocks where some objects were kept in communal corridors. These factors may influence the severity of clutter and therefore influence the level of functional impairment reported by samples in East Asian countries. Whilst these findings suggest a difference in levels of clutter across countries, it is noted that the results could be affected by the variations in evaluating clutter. With many different measures used (e.g., in Nordsletten et al., (2018), clutter is measured using four separate measures), consistency of measurement would provide a clearer picture of clutter across cultures.

Excessive Acquisition

Six papers explored Excessive Acquisition (He et al., 2021; Ye et al., 2021; Timpano et al., 2015; Subramaniam et al., 2020; Ong et al., 2016). Two studies conducted in China and Hong Kong explored the relationship between Compulsive Buying Behaviour (CBB) and HD symptoms (He et al., 2021; Ye et al., 2021). Ye et al., (2021) hypothesised that HD and CBB can be experienced together, and the desire to hoard or own objects may lead to CBB. Ye et al. (2021) found a significant positive relationship between CBB and HD symptoms across

three age ranges (emerging adulthood, $r = 0.47$), early adulthood ($r = 0.53$) and middle adulthood ($r = 0.47$)). However, He et al. (2021) found no significant relationship between the acquisition subscale of the Chinese HRS and CBB. Both studies used the same measures of HD and CBB. Of note, it is important to highlight the non-significant relationship between excessive acquisition and CBB in the He et al. (2021) sample, as it would be expected based on the nature of excessive acquisition that CBB would be a linked construct. Additionally, these two papers did not compare between groups (e.g., HD vs Control), therefore the contribution of these findings to the HD literature is questionable. The nature of acquisition was explored in other studies (e.g., Nordsletten et al., 2018; Subramaniam et al., 2020). It was found in these studies that a minority of participants used their own funds to purchase saved items.

Though total SI-R scores did correlate significantly with CBB ($r = .47$, $p = .001$). These two studies were the only studies exploring the relationship between HD and CBB in China and Hong Kong, therefore it is difficult to draw any solid conclusions from this evidence. In another East Asian study (Timpano et al., 2015), levels of acquisition were found to be higher in a Chinese sample compared to a US sample ($p < .001$). This complements the findings of Ye et al. (2021), which suggests excessive acquisition is linked to CBB in a Chinese community sample. Based on the above findings, it may be that excessive acquisition is more likely to present for individuals with HD in East Asian countries, though further exploration is necessary to clarify these relationships.

There is evidence to suggest that the method of acquisition may differ across cultures. Subramaniam et al., (2020) explored the sources of hoarded objects in Singapore and found that the most common methods of acquisition were through rubbish or recycling bins, received from neighbours or gifted to them by friends or strangers. Only three participants (25%) reported buying the items with their own funds. In Brazil, the nature of acquisition

differed from samples from other countries (Spain and the UK). In particular, those in the Brazilian sample had a higher rate of acquisition of objects from stealing (28.6%). It is worth noting that Nordsletten et al. (2018) did not collect data for acquisition for their Japanese sample. These studies show a different pattern to the findings from Ye et al., (2021) in China, where a high proportion of those with HD also displayed CBB behaviours. In a larger sample from Singapore, Ong et al., (2016) found that 58.1% of a clinical population scored above the clinical cut-off for excessive acquisition. However, when the sample was split into HD and non-HD groups, the HD group scored significantly higher on the excessive acquisition subscale of the SI-R than the non-HD group ($p < .001$, $d = 1.99$). Further analysis found that excessive acquisition was present for all clinical groups within the study (anxiety, depressive disorders, schizophrenia, and pathological gambling) which strengthens the notion of HD being a multi-faceted disorder which includes difficulty discarding and clutter in non-Western cultures.

Methods of acquisition differ between the countries included in this review, where purchasing items appear to be more common in China and other East Asian countries acquiring objects using various methods. The level of stealing items in Brazil is worth further exploration, as this was not reported in any other sample. It has been hypothesised that compulsive buying is linked to HD through the specifier of excessive acquisition, although it may not always fully explain the method of acquiring objects in HD given the variety of findings reported in these studies.

Difficulty Discarding

Results from five studies found similar patterns of difficulty discarding (Subramaniam et al., 2020; Nordsletten et al., 2018; Ong et al., 2016; Timpano et al., 2015; He et al., 2021). Subramaniam et al. (2020), in Singapore, explored participants' experiences with decluttering. Five participants (42%) reported feeling distress and anguish if faced with

discarding their possessions, reporting that they *"can't bear to throw them away"* (p. 460). Those who were subject to decluttering for a variety of reasons felt that this process induced negative emotions, with participants describing distress, feeling wretched, worry, anger, and helplessness. Nordsletten et al. (2018) found no differences in the level of difficulty discarding between the four countries of interest (Brazil, UK, Spain, and Japan). However, the reasons underlying difficulty discarding were observed to differ between the UK and Brazilian samples. What is clear, however, is there is an associated level of distress with discarding possessions found across countries, although the reasons for this distress may differ. As noted by Timpano et al., (2015), cultural norms around objects may influence hoarding behaviour, where in China, beliefs about usefulness in the future, and not being wasteful may particularly play a role in the level of difficulty associated with discarding objects.

In a broad clinical population in Singapore, Ong et al. (2016) observed that 26.5% of the sample reported significant difficulties discarding items. When grouped into HD and non-HD groups, the HD group scored higher on difficulty discarding ($p < .001$) with a large effect size ($d = 2.18$). He et al. (2021) observed a significant positive relationship between difficulty discarding and compulsive buying. However, this relationship was weak ($r = .293$, $p < .01$). Timpano et al. (2015) reported significantly higher scores on the difficulty discarding subscale of the SI-R in their Chinese sample compared to a US sample ($t (388) = 6.35$, $p < .001$). Findings suggest that whilst difficulty discarding is a common experience across cultures for those with and without HD, those living in East Asian countries may find discarding possessions more difficult.

Objects Hoarded

Three papers recorded the types of objects hoarded in their samples (Kuwano et al., 2020; Matsunaga et al., 2012; Subramaniam et al., 2020). There were similarities across

countries of the types of items hoarded, for example, newspapers, magazines, documents, drinks bottles, plates, drinks cans, glass bottles, toys, and clothes. There were also differences observed in the type of objects saved, for example, in Singapore, participants reported saving electronic items such as computers, TVs, and typewriters whilst there were no reports of electronic items collected in Japan (Matsunaga et al., 2012; Kuwano et al., 2020). In both Japanese samples, there appear to be a more diverse range of information collected, for example advertising circulars, textbooks from school, books, and religious publications (used to protect from fears of something terrible happening). Faeces, rotten food, and used nappies were also reported in Matsunaga et al. (2012), with none of these items being described by the sample in Singapore (Subramaniam et al., 2020) or the Japanese sample in Kuwano et al. (2020). This may be due to the potential for embarrassment during the interview process in the Singapore sample, where in-depth, face-to-face interviews were conducted with the researcher and participants. The sample from Matsunaga et al. (2012), however, was part of a large-scale study where responses were collected via multiple different methods (e.g., clinical interview (Structured Clinical Interview for DSM-IV), semi-structured face-to-face interview, medical notes, psychometrics). Therefore, it is likely that embarrassment around the nature of objects hoarded may still play a role during interviews for this sample. One possibility regarding the differences noted between types of objects hoarded may be the sample sizes. Subramaniam et al., (2020) had a smaller sample size due to the qualitative nature of the study (n = 12), whereas Matsunaga et al. (2012) had a larger sample of hoarders (n = 54) which likely increases the variety of objects hoarded in these studies.

Cognitions and beliefs in HD

Cultural differences in the cognitive aspects of HD were observed, including reasons for saving, beliefs about hoarding, and level of insight. Seven papers explored these constructs (Chakraborty et al., 2012; Matsunaga et al., 2012; Kuwano et al., 2020;

Subramaniam et al., 2020; Ong et al., 2016; Timpano et al., 2015; Yorulmaz & Demirhan, 2015).

Insight into HD varied across cultures. Chakraborty et al. (2012) reported that within their sample of Indian participants, those in the HD group approached the outpatient clinic (recruitment site) for problems associated with OCD; none of the participants approached the clinic for support for hoarding. Additionally, all participants in the HD group did not acknowledge their hoarding behaviour as unreasonable or excessive, and therefore felt that treatment for HD was not required. Using the Y-BOCS as a measure of insight into obsessions and compulsions, the paper reports no significant differences between the HD group and non-HD group. However, the paper set the *p* value at .01. The results show that the HD group held less insight into their behaviour compared to the non-HD group ($p = .036$). The choice to use $p = .01$ as the value for significance therefore means this result was not significant in the context of this paper. A *P* value of less than .01 was decided upon not for correcting for multiple tests, but as a more conservative value to minimise the risk of false positives. Similar to the results in India, Japanese participants' total scores on the Y-BOCS were significantly higher than those in the non-HD (OCD) groups and had poorer insight into their behaviours (Matsunaga et al., 2012).

In an in-depth exploration of HD behaviour in hoarders from Singapore, Subramaniam et al. (2020) extracted two superordinate themes relating to beliefs about hoarding and level of insight: *Reasons for Hoarding* and *Insight.* Six sub-themes were included in the superordinate themes: relationship with hoarded items, strategy to deal with an uncertain future, avoiding waste, difficulty discarding, role of family, and life events. The majority of participants interviewed noted that their relationship with objects was one of companionship, with objects providing a sense of companionship. Three stated that they could sell the objects on to others in the future, three participants also described objects as a

heritage piece for future generations to use or keep. Hoarding objects as a form of dealing with an uncertain future was reported by the majority of participants in Subramaniam et al. (2020), holding on to two or more of the same object for fear of not being able to afford these in the future. Another sub-theme was avoiding waste, where participants felt that collecting was an act for preserving the environment and holding on to items to donate in future or repurpose was a positive thing to do. Six participants also ascribed their behaviour to familial factors, such as family member enabling hoarding behaviour or leading to vulnerabilities for hoarding. This sub-theme linked to another, significant life events, where participants attributed a single event in their lives which opened the door to HD, such as unemployment.

Additionally, Japanese participants were often unable to explain the reasoning for collecting certain items such as newspapers, books, or cardboard boxes in this paper. However, Kuwano et al. (2020) reported the most common reasons for hoarding were possible uses in the future and sentimental attachment (63.3% and 60% respectively) in Japan. They also reported no difference in levels of insight between the HD and OCD group, with 23.3% and 35% respectively showing poor insight (p = .37).

Matsunaga et al. (2012) separated hoarders into two groups – primary and secondary HD. Primary HD is described as HD being the primary problem faced by the participant, whereas secondary HD is where hoarding is secondary to a second disorder such as OCD. The results showed that those in the primary HD group were more likely to explain their hoarding behaviour to be the result of a fear the object may be needed in future or a strong emotional attachment to the object(s), leading to difficulties discarding. Secondary hoarders were more likely to experience fears of contamination, magical thinking, or a need for symmetry with possessions.

Ong et al. (2016) corroborated the findings in Singapore using quantitative methods and found that those with HD had significantly higher scores on the Saving Cognitions Inventory, with hoarders scoring higher on all subscales including emotional attachment to objects, a sense of control (linking to uncertainty), responsibility, and memory. Again, the majority of participants in the study showed a lack of insight into their hoarding behaviour and the associated consequences and attributing other's complaints to jealousy, minimising complaints and minimising the issues associated with their hoarding behaviour.

In a Chinese sample Timpano et al., (2015), three factors were added to the original SIR which introduced themes that were seen to be appropriate for Chinese culture: wastefulness, potential usefulness (reflecting the Chinese phrase *waste not*), and beliefs about aesthetic qualities. Results showed the Chinese sample scored significantly higher on each of the SCI subscales, compared to a US sample. However, only the total SCI score and beliefs about usefulness and wastefulness were significantly correlated with HD symptoms in the Chinese sample. Nordsletten et al. (2018) observed similar beliefs around hoarding in Brazil to those found in Singapore (Subramaniam et al., 2020). The notion that items hoarded would be useful in future was endorsed by Brazilian participants, mirroring findings in China and Japan. Saving an object due to its perceived uniqueness was endorsed less in the Brazilian sample compared to the UK sample. Emotional attachment to objects, however, was reportedly lower in the Brazilian sample. These findings suggest that cultural differences may influence the development of HD symptoms based on cultural perceptions and norms of reducing waste and perceptions of usefulness in the future.

Yorulmaz and Demirhan (2015) was the only paper to report cognitive correlates of HD, exploring how coping strategies in the Turkish population are related to HD. They observed that indecisiveness and attachment to objects were significantly positively related to the severity of HD. Using the metacognitions questionnaire (MCQ-30; Wells & Cartwright-

Hatton, 2004), the results showed all subscales of the MCQ were related to all dimensions of HD as measured by the SI-R, apart from Cognitive Self-Consciousness (a preoccupation with one's thoughts). Whilst the positive relationships were small, these results provide an insight into the ways people in non-Western cultures may deal with their distress, and how this may link to HD behaviour within these cultures. Whilst these findings from Yorulmaz and Demirhan (2015) show cognitions associated with HD in their paper, participants were all selected from employers of large companies, and therefore those who are unemployed in Turkey are not represented in the study findings. Cognitions associated with HD behaviour may differ between those who are employed as access to resources (e.g., financial resources) may influence cognitions associated with HD.

Impacts of Hoarding

Four studies reported data for functioning and quality of life (Kuwano et al., 2020; Subramaniam et al., 2020; Matsunaga et al., 2012; Ong et al., 2016). A number of different psychometrics were used in order to assess daily functioning and quality of life in the study samples. All included studies report a lower quality of life and lower functioning in their respective HD groups compared to healthy controls and OCD without HD groups. This suggests that the nature of HD and its effects on an individual's life is a universal experience in HD. This is consistent with findings from qualitative investigations; Subramaniam et al. (2020) summarised these experiences in their exploratory study into HD in Singapore and produced three sub-themes: strained relationships with family and friends, conflict with neighbours, and impact on self. One participant described the feeling of physical entrapment in their home alongside psychological distress that was compounded by stigma and prejudice experienced by their neighbours and wider society.

Predictors of HD

Predictors of HD were reported in Singapore (Ong et al., 2016), India (Chakraborty et al., 2012), China (Xu et al., 2015) and Turkey (Yorulmaz & Demirhan, 2015). Comorbid disorders were used to predict HD, as well as coping strategies and other cognitive correlates in the Turkish sample. In Singapore, depressive symptoms significantly predicted the severity of HD, independent of anxiety. Anxiety was not found to be a significant predictor of HD (although approached significance, (p = .054), despite often being associated with OCD and related disorders (DSM-5; APA, 2013). Xu et al. (2015) observed in their Chinese sample that anxiety mediated the relationship between autistic traits and HD. They reported that autistic traits predicted hoarding severity (p < .001), and when anxiety and depression were included together, the influence of autistic traits reduced, although remained significant (both p < .001).

In India, aggressive obsessions, total number of compulsions and total Y-BOCS score were all found to be significant predictors of HD. The presence of a previous suicide attempt at any stage in life was also found to be a predictor of HD. For psychiatric disorders that predict HD, avoidant personality disorder and dependent personality disorder were observed to be significant predictors.

In Turkey, cognitive factors and methods of coping (using the Ways of Coping Inventory – Revised; Senol-Durak et al., 2011) were used in the regression analysis to predict HD severity (Yorulmaz & Demirhan, 2015). The results showed that positive predictors of HD were beliefs in supernatural forces, accepting responsibility, and escape/avoidance. In contrast, a negative predictor of HD was planned problem solving. This suggests that belief in the supernatural (e.g., religion) may influence how much control the individual perceives they have over their lives and may be linked to a lack of planning in terms of problem solving, leading to difficulties managing difficult experiences that lead to hoarding

behaviour. Three metacognitive factors measured by the MCQ were also found to be positive predictors of HD: positive beliefs about worry, negative beliefs about worry, and cognitive confidence. Additionally, emotional attachment to objects and indecisiveness were significant predictors of HD. Taken together, these studies provide a template of possible risk factors for the development of HD from a psychological perspective (e.g., coping, metacognitions) which may highlight risk factors for those in non-Western cultures developing HD.

Discussion

This review examined hoarding in non-Western cultures, focusing on eleven papers from seven countries: Japan (Matsunaga et al., 2012; Kuwano et al., 2020; Nordsletten et al., 2018), Singapore (Ong et al., 2016; Subramaniam et al., 2020), China (Ye et al., 2021; He et al., 2021; Xu et al., 2015), Hong Kong (Ye et al., 2021; He et al., 2021), Brazil (Nordsletten et al., 2018), India (Chakraborty et al., 2012), and Turkey (Yorulmaz & Demirhan, 2015). The findings suggest that the prevalence of HD is similar to the West, but research in non-Western cultures is limited. It is therefore important to study these populations further to understand HD in different cultures. Similarities were found in level of insight, quality of life, objects hoarded, psychiatric comorbidity and distress related to discarding both between non-Western cultures, and Western and non-Western cultures. Differences were observed in diagnostic characteristics of comorbid disorders, age of onset, marital status, living situation, reasons for saving, clutter, and acquisition. These findings are discussed in the context of non-Western cultures and compares them to Western studies.

Demographic profiles of those with HD varied across cultures. Differences were observed in the number of married participants, compared to unmarried, in addition to differences in those living alone. Non-Western samples appear to show higher rates of marriage than Western samples. For example, 47% and 46.7% of participants were married in Brazil and Japan, respectively, compared to 13.8% in the UK (Nordsletten et al., 2018).

However, Mogan et al., (2012) reported 43% of their HD group were married, suggesting variations in the level of marriage depending on selected samples. Nordsletten et al. (2018) suggest this may be due to cultural differences, specifically in the norms around marriage and divorce, where divorce rates may be higher in Western cultures. Similarly, rates for living alone differed between Western and non-Western cultures, with fewer participants in Japan living alone compared to the UK (23.5% and 72.4% respectively; Nordsletten et al., 2018). This may be due to cultural expectations around caring for family, and norms around adults living with family for longer, in order to care for parents, for example.

Age of onset varied between non-Western cultures, although there was missing data in Nordsletten et al. (2018) which did not allow for comparisons between all countries included. Age of onset for overall HD appeared to be much earlier in life for East Asian samples, compared to India and Brazil, for which culture may have an influence. Earlier age of onset, for example, may not be the most accurate way of describing this phenomenon, as it may in fact be the age of becoming aware of saving behaviour. These differences, therefore, may reflect the nature of saving norms in different cultures, and the point at which saving becomes excessive and problematic may differ between cultures.

Differences appeared when comorbidity was explored. For example, levels of anxiety and OCD were lower in Japan compared to Brazil, whereas levels of OCPD were higher in Japan. In a Western sample, Frost et al. (2015) found high rates of comorbid MDD and compulsive buying, with fewer than 20% of participants meeting the criteria for an OCD diagnosis. Frost et al. (2015) observed no specific anxiety disorder was more prevalent in HD than non-HD participants. This highlights the possible differences between Western and non-Western cultures and its associated comorbidities. Frost, Steketee and Tolin (2011) found that 28% of hoarders in their Western sample had comorbid ADHD. Comparing this to Kuwano et al. (2012), 26.7% of their HD sample had comorbid ADHD, suggesting that ADHD may

be a common factor for those with HD across cultures. Autistic traits were also found to be related to HD in a Chinese sample (Xu et al., 2015), although this study did not recruit a clinical sample of hoarders, the results are comparable to Pertusa et al. (2011) who found that whilst there is an association between autistic traits and HD, those with HD do not display more traits than other psychiatric groups.

The review indicated that individuals with HD experience impaired quality of life and functioning. These findings align with similar studies conducted in Western cultures (e.g., Tolin et al., 2019; Saxena et al., 2011). Additionally, the majority of papers reported poor levels of insight, which is consistent with observations in Western cultures (e.g., Frost et al., 2010). Therefore, we can conclude that poor insight and level of impairment and functioning is stable across cultures, meaning poor insight and functioning is pervasive across the world for those living with HD.

Levels of clutter varied across cultures included in this review, with the CIR being the most used method of assessing clutter. East Asian countries reported higher levels of overall clutter, including Western samples (e.g., Spain and UK; Nordsletten et al., 2018). Supporting this, Timpano et al. (2015) found higher levels of clutter in China compared to the USA. These findings may be due to cultural factors on perceptions of clutter and what is deemed appropriate, and warrants further exploration.

Reasons for saving and difficulty discarding appear to have some similarities across cultures, along with slight variations. Brazilian participants were more likely to save due to a perception the item may be useful in future, alongside participants in Japan and China (Kuwano et al., 2020; Nordsletten et al., 2018; Subramaniam et al., 2020; Ong et al., 2016). In Singapore, concern about not accessing items in the future was also endorsed by participants (Subramaniam et al., 2020), but was not endorsed elsewhere. When comparing a

Chinese community sample to a sample from the USA, Chinese participants endorsed all savings beliefs at a stronger rate than those in the USA. As this was a community sample, it shines some light on the cultural view in China of objects being more useful and worth saving, whereas in the USA, objects may be seen as more disposable and therefore less importance is placed on inanimate objects. Whilst there are some similarities and differences across cultures, there was a common thread throughout the results that discarding possessions was a distressing experience for hoarders across cultures, highlighting that attachment to objects and associated distress when discarding is a common theme in HD across both Western and non-Western cultures.

Results indicated that there were commonalities between types of objects hoarded in the studies included in this review. Comparing these results to Western findings (e.g., Mogan et al., 2012) suggests that the types of objects hoarded in non-Western cultures differs in some respects. For example, Mogan et al. (2012) reported that among the most common items hoarded in their sample were books, mementos, and souvenirs. However, the most common items in Asian samples included plastic items such as plates, bags, and containers, alongside newspapers and magazines. Similarities were found with saving of clothes and documents (i.e., statements, receipts), but there appears to be fewer items in common between the samples. This may highlight a cultural influence with the nature of objects hoarded, in line with the suggestion that those in East-Asian countries may hoard as a result of avoiding waste, whereas in Western cultures, the motivations underlying saving may differ. Nature of acquisition also differed between countries, where Brazil was the only country to report acquisition of objects via stealing. Compulsive buying was linked to acquisition in China (Ye et al., 2021) but not linked in a separate Chinese study (He et al., 2021). The method of assessing acquisition in these studies used a subscale of the Chinese-HRS. Further research into acquisition would benefit from using an in-depth assessment of

HD subscales, such as the SI-R which consists of a more detailed assessment of acquisition. Timpano et al. (2015) found higher levels of acquisition in China compared to a US sample, which supports the findings from He et al. (2021). Taken together, these findings suggest that levels of acquisition are higher in East Asian countries compared to Western samples.

Strengths and Limitations

As this review included English language only papers, there may be potential bias in terms of the results reported. Papers exploring hoarding behaviour in non-Western cultures are likely to be published in languages other than English, meaning important findings may be lost when these have not been translated and therefore not included in this review. This may lead to a Western-centric perspective of hoarding in these cultures, where ultimately the disorder is viewed through a predominantly western lens. However, the timescale and resources available during the review period meant that searching and translation of non-English was not feasible. Further reviews would benefit from including non-English publications in their search criteria.

One limitation stems from the title and abstract screening stage, where only 10% of results were screened by an independent rater. This approach may lead to the omission of relevant studies, risking selection bias and errors during the screening stage. A second reviewer screening all results at this stage would reduce the likelihood of these errors and strengthen the selection process utilised for this review. Further reviews of this nature would benefit from a second reviewer at the title and abstract screening stage to screen 100% of results to ensure rigor and maintain objectivity throughout the review. However, full texts requiring review were all rated by an independent rater against inclusion and exclusion criteria, allowing for disagreements to be noticed and discussed if this was necessary during the review process.

It is also important to note the variation in methods used across all studies to assess Hoarding Disorder. Whilst all studies either used a detailed clinical interview or validated measure of HD (as per inclusion criteria), all measures were originally developed from a Western-centric perspective of HD (according to DSM criteria). This means that the definition of HD across these studies is focusing on the disorder from a western lens and may miss important factors of HD across other cultures and countries. Timpano et al. (2015) conducted a factor analysis of Chinese-SIR, where the measure was adapted for Chinese participants. Timpano et al. (2015) removed two items (items 2 and 4) from the SIR as these items did not reach an acceptable model fit with a Chinese sample. Conversely, other papers used direct translations of measures (e.g., Nordsletten et al., 2015) which did not explore the factor structure and how the items would translate meaningfully into difference cultures, leaving the potential to lose important facets of HD that do not translate directly from English.

Overall, the quality of the papers included in this review were good. The MMAT rated six papers as good (i.e., no concerns regarding methodology), with five reporting at least one concern (see Appendix B). These concerns were largely to do with sampling strategies and representativeness of the target population. These studies provide useful insights into the nature of HD in non-Western cultures and provide a foundation for further hypothesis-driven research to explore in more targeted participant groups. The variation in assessment tools and methodology makes direct comparison of results difficult. For example, in Nordsletten et al. (2018), participants from four countries were recruited to the study, but were given different psychometrics and certain aspects of HD were unexplored at times (e.g., acquisition of items was not explored in Japan). This inconsistency of data collection, alongside differences in measurement mean that direct comparisons and conclusions are difficult to obtain from the included papers alone.

The systematic approach used in this review holds multiple strengths. It ensured a comprehensive review of the existing literature using multiple, wide-reaching databases and minimising the risk of selection bias by ensuring strict inclusion and exclusion criteria were applied and adhered to. The use of the MMAT allowed the author and reviewers to critically appraise each included paper to assess study quality and therefore interpretations of the results. This systematic approach to reviewing the literature allows other researchers to replicate the method, enhancing and promoting open science practice. This approach has led to a clearly defined, evidence-based synthesis of the existing literature for HD in non-Western cultures.

Clinical and Research Implications

These findings highlight some of the similarities and differences in HD across different cultures to help build a better understanding of HD. The cognitive behavioural (CB) model of HD proposed by Mathes et al. (2020) include environmental factors of which culture could be included. The findings that some cultures are more likely to save items based on wastefulness and usefulness beliefs may be a risk factor for HD in some cultures. While HD generally presents consistently across cultures, variations exist in beliefs about HD, emphasizing the need for culturally sensitive interventions, which are currently absent from the CB model proposed by Mathes et al. (2020). Predictors of HD, comorbidity and lack of insight appear to be consistent across cultures, therefore it is important to consider these when exploring HD across cultures, where evidence from Western cultures may still be relevant. These findings may also contribute to the understanding of mental health problems across cultures, as other psychiatric problems may manifest in similar ways, despite the underlying beliefs and ways of coping being different from those in Western cultures. This review highlights the need for culturally sensitive assessment, formulation, and interventions for HD as a ‘one size fits all’ approach to HD may not be appropriate, given the treatment for

HD is largely dominated by Western evidence. One example, from Timpano et al. (2015), highlights the cognition of items being useful in future, reflecting the Chinese phrase of "waste not", being significantly associated with HD compared to a US sample. Through acknowledging this, existing interventions can be tailored to specific cultures based on this knowledge, where beliefs, influencers and values that exist in each population are taken into consideration within the therapeutic space. This information allows clinicians to notice slight cultural differences that may influence the presentation of HD and provides permission to explore the influence of culture when this may not be previously incorporated into assessment or formulations when working with individuals with HD.

There is limited research directly comparing HD between Western and non-Western cultures, with only two papers in this review doing so (Timpano et al., 2015 and Nordsletten et al., 2018). It is therefore difficult to draw definitive conclusions on cultural differences. Further research is needed to both compare HD in different cultures and to gain a better understanding of cultural influences of HD. Additionally, future research comparing Western and non-Western cultures would benefit from including consistent assessment tools and methods. Gold standard assessment would include a full clinical interview, alongside self-report measures.

Further research would benefit from a grounding in psychological models of HD, such as that proposed by Mathes et al. (2020). Using a model such as this as a platform, (where environmental influences are incorporated into the model under "core vulnerabilities" that interact with maladaptive cognitions, information processing deficits, and dysfunctional attachments) further research could disentangle the cultural influences of HD where culture is recognised as a factor that may contribute to the formation of HD. This research could explore specific cognitions or beliefs around saving, or wider influencers such as

relationships and socioeconomic status that may help build on the cognitive-behavioural model of hoarding to gain an in-depth understanding of HD across the world.

This is the first systematic review to explore hoarding in non-Western cultures which highlights the prevalence, clinical characteristics, and predictors of HD beyond Western contexts. This review highlights the importance of taking a global approach to research in mental health to explore the similarities and differences between Western and non-Western countries, in a field where Western research has dominated.

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Title: Attachment to the self, others, and objects in Hoarding Disorder: An Empirical Investigation

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Abstract

People with Hoarding Disorder (HD) exhibit a heightened attachment to their belongings. It is also observed that individuals with HD tend to exhibit dysfunctional attachment styles. Furthermore, there is evidence suggesting that the relationship with oneself is also impaired in individuals with HD. However, no previous studies have investigated the interplay between these constructs within the context of HD. The aim of this study was to explore the differences in the relationship with the self (Self-Model), relationships with others (Other-Model), and object attachment across three groups: HD (n = 47), obsessive-compulsive disorder (OCD; n = 27), and a healthy control group (n = 44). Participants completed online questionnaires to allocate them to the appropriate group (HD, OCD, or Control) before completing questionnaires to measure the three dependent variables (Self-Model, Other-Model, and Object Attachment). A MANOVA analysis, followed by post-hoc tests, revealed statistically significant differences in the Self-Model between the clinical groups (HD and OCD) and the control group. Similarly, significant differences were observed in the Other-Model between the clinical groups and the control group. The HD group exhibited significantly higher levels of object attachment compared to both OCD and control groups. No significant differences were found in the self-model and other model between the OCD and HD groups. The findings indicate that individuals with HD display significantly stronger attachment to objects when compared to those with OCD and controls. However, there were no significant differences in the relationship with oneself or with others between the two clinical groups. The implications of these findings are discussed.

Keywords: Hoarding Disorder, Attachment, Object, Self, Other

Introduction

Hoarding Disorder (HD) is characterised by individuals finding difficulty with discarding possessions, and excessive clutter in the home that makes activities of daily living difficult and has a significant impact on quality of life (American Psychiatric Association [APA], 2013). Excessive acquisition of objects is also included as a specifier of HD, rather than being a core criterion for diagnosis (APA, 2013). With the release of the Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5, APA, 2013), HD is now characterised as a standalone disorder, moving from a subset of symptoms associated with obsessive-compulsive disorder (OCD). The worldwide prevalence of HD is estimated to be 2.5% (Postlethwaite et al., 2019). Sixty per-cent of individuals with HD report developing symptoms around the age of 12 years old (mean age = 13.4), and by age 18, 80% of adults with HD reported developing symptoms (Grisham et al., 2006). Hoarding poses risks such as fire, falls, contamination, infestation, unsanitary conditions, and blocked escape routes (Steketee & Frost, 2014). It is also associated with unemployment, difficulties undertaking activities of daily living, and financial struggles (Tolin et al., 2008). It is suggested by Tolin et al. (2008) that societal costs of hoarding surpasses that of other psychological disorders such as anxiety and depression. Hoarders can also face social isolation, shame and experience being shunned by their communities and support networks as a result of their hoarding behaviour.

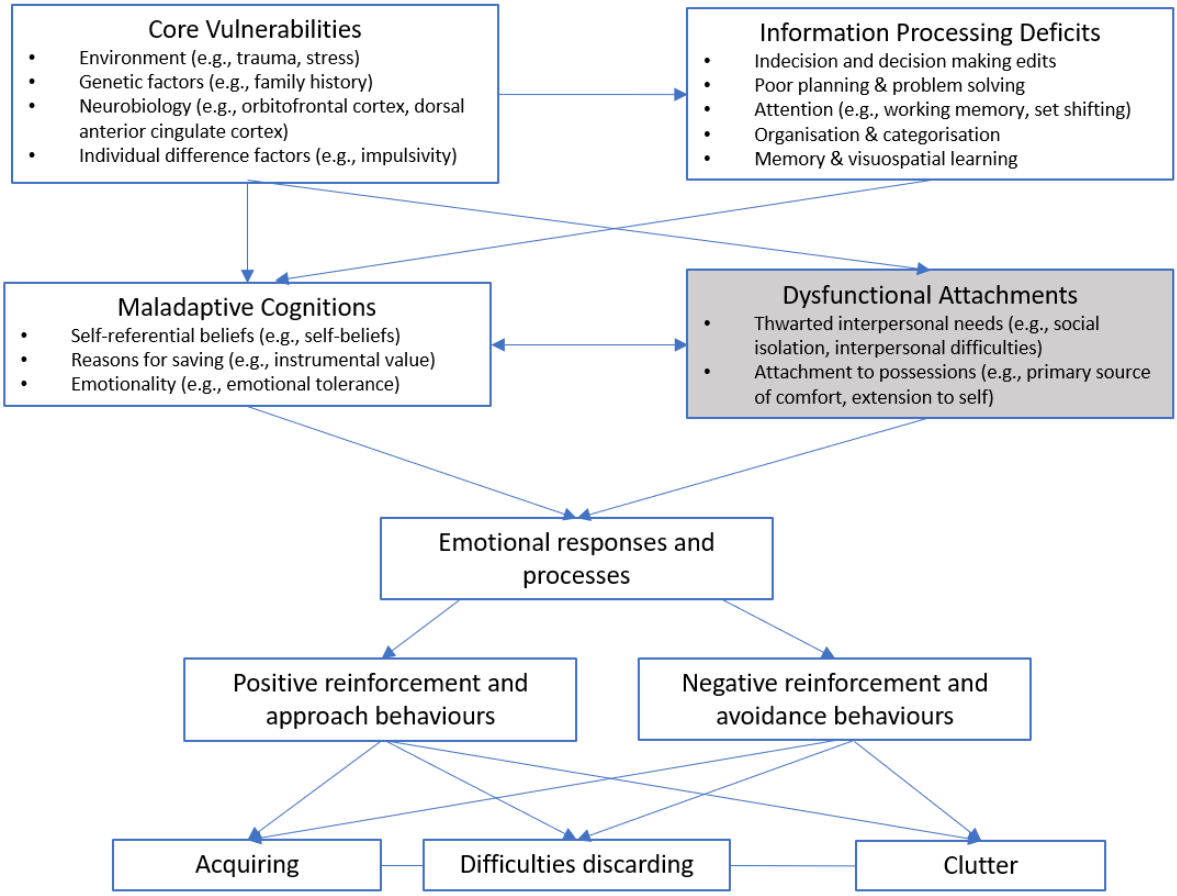
Cognitive Behavioural Model of Hoarding Disorder

A recent Cognitive Behavioural (CB) model of HD (Mathes, 2020) presents core vulnerabilities (e.g., genetics, environmental factors such as trauma and stress), information processing deficits (e.g., poor planning and problem solving), maladaptive cognitions (including self-referential beliefs) and dysfunctional attachments (e.g., disrupted attachments with others, attachment to objects) as the four main contributors to the emotional responses

and processes that lead to hoarding behaviour. Figure 1 displays the CB model described by Mathes et al. (2020).

Figure 1

CB model of HD from Mathes et al. (2020)



This model offers an explanation of contributors to HD that considers a biopsychosocial explanation. Attachment to objects and others is a significant aspect of the model, where those with HD have a strong attachment to objects which may be due to the absence of secure attachment to others (i.e., thwarted interpersonal needs). However, as Mathes et al. (2020) highlight, the nature of attachment to objects is unclear. Grisham et al. (2009) noted that attachment to possessions and objects is not exclusive to HD, and that those with high levels of attachment to their possessions may not go on to develop clinically significant hoarding behaviours. It is therefore important to explore additional components of

the model that may explain why some individuals develop hoarding symptoms, particularly the role of attachments and relationships with others. In their review, Mathes et al. (2020) summarised the literature on attachment theory and HD and conclude that those with HD are more likely to be insecurely attached to others, and possessions are viewed as their primary attachment figure in order to compensate for these insecure attachments. This may be due to possessions providing a sense of security, safety, and stability in their lives, or even viewing their possessions as an extension of themselves and their individuality (Dozier et al., 2017).

Attachment theory

Attachment theory (Bowlby, 1979) suggests that as infants, we use our primary care givers (e.g., mothers, fathers) as a secure base from which to explore the world. The secure base provides safety and comfort in new environments and in response to emotional or physical distress. From the work of Ainsworth (1969) and Bowlby (1979), three main attachment styles – secure, avoidant, and anxious/ambivalent - were identified. A fourth category of insecure attachment, disorganised, was proposed in 1986 (Main & Solomon, 1986). There have been variations in the language used to describe the four attachment styles, therefore, to ensure consistency, they will be referred to by the following: Secure, Avoidant, Anxious (preoccupied) and Fearful (disorganised). Insecure attachment often indicates a less predictable and consistent base, leading to different behaviours depending on the nature of the individual's attachment style and the life events they encounter. In adult relationships, attachment styles are strongly linked to the 'internal working model' (IWM) of relationships, developed from relational experiences during infancy (McCarthy & Maughan, 2010). The IWM refers to an individual's mental representation of their relationship patterns, including expectations and perceptions of self and others in relationships (Bretherton & Munholland, 2008). The development of the IWM starts from birth and develops over time based on the individual's experiences within relationships. Early relational experiences with caregivers

provide a foundation for future relationships with others, including romantic relationships. A secure base is most prevalent in securely attached infants, with the caregiver providing predictable and consistent care, and providing ample opportunities for the infant to learn self-regulating behaviours.

Attachment to others in Hoarding Disorder

Attachment to others has been widely researched in the context of HD (Mathes et al., 2020), with evidence suggesting that those with HD are more likely to experience an insecure attachment style compared to healthy controls. Parker and Forrest (1993) reported that hoarding-like behaviours (i.e., accumulation of inanimate objects) was one of the behaviours observed in children with non-attachment (i.e., no secure base formed). This provides evidence that in the absence of a secure attachment, children may turn to objects as one strategy for emotion regulation.

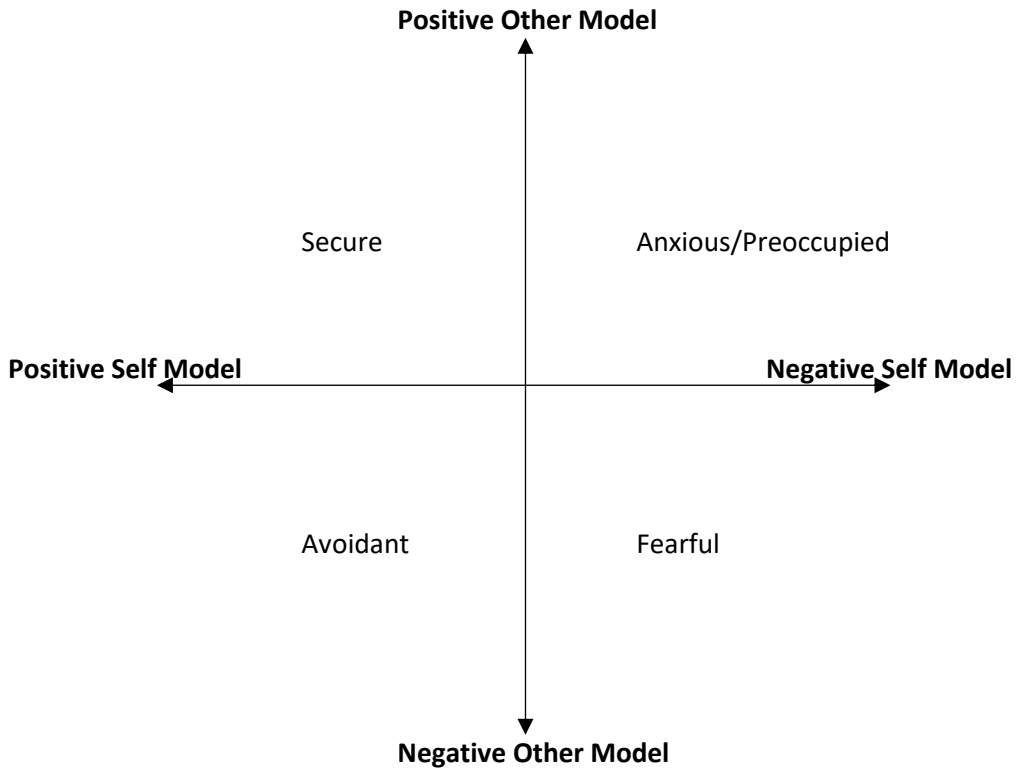
Whilst those with secure, avoidant, or fearful attachment styles are represented within HD population, anxious attachment has been found to be the most common interpersonal relational style in HD (Barton et al, 2021). This suggests that adults with HD are more likely to experience negative self-evaluation and fears of abandonment by others (i.e., negative self-model, negative other model), which may influence how they further interact with the world and those around them.

The CB model of HD suggests that objects can play a compensatory role in self-regulation, in that objects become the primary source of comfort for the individual. Nedelisky and Steele (2009) examined attachment relationships within an OCD sample, with two groups (OCD with Hoarding symptoms, and OCD without Hoarding symptoms). They found that hoarders demonstrated significantly higher fear of losing possessions, compulsive care-seeking, and less ability to use these objects in times of need, compared to the non-hoarding group. However, this study found no difference in attachment to others between their OCD

and HD groups. The increased level of object attachment and no difference between interpersonal attachments suggests that, at least for adults with comorbid OCD and HD, objects may be seen as a source of comfort and care compared to a group with OCD without HD. Therefore, attachment to objects may be higher in HD, supporting the CB model of HD, where possessions play an important role in self-regulation. Similarly, in their review, Mathes et al. (2020) concluded that whilst those with HD are more likely to experience insecure relational styles, there does not appear to be significant differences between HD groups and other clinical groups such as OCD.

Figure 2*:*

Four factor model of attachment (Griffin & Bartholomew, *1994)*



Attachment to self in Hoarding Disorder

As described above, the relationship with the self (Self-model) is created through the individual's mental representation of their own self and use this representation to evaluate their experiences and guide their relationships. This model of self can be seen in the CB model of HD (Figure 1) which includes "self-referential beliefs (e.g., self-beliefs)" as part of "Maladaptive Cognitions". A parallel can be drawn between these cognitions and model of the self as attachment theory states that early relationships shape the cognitions one experiences when in adult relationships (e.g., feeling worthless, lack of self-belief, and an overall negative view of oneself), (Hazan & Shaver, 1987). The model of the self can be described using the four attachment styles outlined by Bartholomew and Horowitz (1991; see figure 2). From this, we can assess the model of the self as positive or negative based on composite scores derived from the Relationship Scales Questionnaire (Griffin & Bartholomew, 1994) which provides a quantifiable method of assessing model of self.

Within the HD literature, there is some evidence to suggest a relationship between a negative model of the self and hoarding behaviour. For example, in a sample of female undergraduates, Frost et al. (2007) found a significant association between self-ambivalence (questioning one's self-worth) and uncertainty (about oneself and others), and compulsive hoarding behaviours. They also noted that self-ambivalence and uncertainty was associated with compulsive acquisition of free items. Whilst the study used a non-clinical sample, the findings suggest that uncertainty about the self and others may lead to hoarding-like behaviours. Findings from Danet & Secouet (2018) which explored the self-model and other model in a non-clinical sample of females in France reported a significant negative correlation between HD severity and model of self, with no relationship between model of others and HD severity. When exploring predictors of HD, only Anxious attachment (negative model of self, positive model of other) was a significant predictor of HD. This

appears to be the only research exploring both the model of the self and model of others in the HD literature, and it shows that there may be a role of a negative model of self in HD, as there was no relationship observed between the model of others and HD severity. Chou et al., (2018) relate these findings to previous literature, where hoarding behaviour may be a compensatory strategy, albeit maladaptive, for a negative model of the self. The model of the self, therefore, can be applied to the understanding of HD where research has shown that individuals with HD have a strong attachment to their possessions as a compensatory strategy for a compromised model of self.

In the present paper, perceptions of self and other will be conceptualised using Griffin and Bartholomew's (1994) four factor model of attachment. Figure 2 displays how the Self- and Other-Model maps on to the four attachment styles.

Object attachment in Hoarding Disorder

Attachment to objects has been identified as a contributor to the development of HD (Frost and Hartl, 1996). Frost and Hartl (1996) highlighted that those with HD often have an inflated level of attachment to objects and a propensity to view possessions as links to self-concept and the identities of others. There is evidence to suggest that those with HD hold a strong attachment to objects which fulfil attachment needs, compared to other clinical groups and controls (e.g., Frost et al., 1995; Mathes et al., 2020 for a review). Norris et al. (2012) suggested that objects may act to fill the void left by insecure attachment styles (anxious and fearful) and therefore provide secure attachment in place of relationships with others.

This is demonstrated by the idea of an object providing a secure base and difficulty parting from possessions (e.g., Frost et al, 2015), consistent with attachment to others. In non-hoarding populations, Ferraro et al. (2011) and Morrison & Johnson (2011) suggest that those who hold an uncertain sense of self and identity may use objects to help create a sense of connection to others. Additionally, Keefer et al. (2012) highlight that an increase in

attachment to objects is related to higher perceptions of unreliability in others. Perceiving others as unreliable is akin to an insecure attachment style, and therefore these results may be partly explained by objects providing a secure base in the absence of reliable and secure relationships with others. However, these studies were conducted using non-HD samples, therefore, results can only be tentatively connected to HD itself. The strength and nature of the self-representation influences an individual's emotional responses and sense of identity. It also plays a role in regulating attachment behaviours and shaping relationships with others (McCarthy & Maughan, 2010). Self-criticism and shame have also been found to contribute significantly to HD severity (Chou et al., 2018). This study highlighted the role of self-criticism (e.g., self-attack and self-hate) and shame about oneself as a person and/or hoarding behaviour are more likely to experience more severe HD symptoms. Mathes et al. (2020) hypothesise that the role of objects in HD is to compensate for unsatisfying, insecure, or absent interpersonal relationships with which the relationship to objects serves to increase saving behaviours.

Attachment to objects, attachment to others, and self-attachment are crucial aspects to consider in understanding HD. However, previous research has primarily examined these areas in isolation or in various combinations, although this has not included comparisons across groups to understand specific relationships. This study aims to integrate all three constructs to explore their relationships with HD in comparison to other groups. By examining the nature of object attachment, attachment to others, and self-attachment, this study seeks to enhance our understanding of the role of attachment in HD. The study presents three hypotheses to guide its investigation. The first hypothesis predicts that the OCD and HD groups will show a more negative model of others compared to controls, as evidenced by previous research highlighted above. Hypothesis two predicts that compared to an OCD group and non-clinical control group, people within the HD group will have a stronger

attachment to objects. The third hypothesis predicts that the OCD and Control groups will have a more positive model of the self.

Method

Design

A cross-sectional design was employed with three independent groups (HD, OCD, Control). Dependent variables for this study were model of others and model of self (measured by the RSQ; Griffin & Bartholomew, 1994), and relationship with objects (measured by the RAQ-A; Nedelisky & Steele, 2009).

Participants

A total of 167 participants were recruited for this study online using Call for Participants (online recruitment software), social media and undergraduate students through a university recruitment system. Participants recruited outside of the university system were entered into a prize draw to win one of three £50 shopping vouchers. Those who participated through the university recruitment system were provided with course credits.

Participants were eligible for the study if they were aged 18 or above and did not report a diagnosis of a neurological condition. For inclusion in the HD group, participants were required to score 14 or above on the Hoarding Rating Scale – Self-Report (HRS-SR; Tolin et al., 2010). For inclusion in the OCD group, participants were required to score above the clinical cut-off score of 12 on the OCI-OCD subscale on the Obsessive-Compulsive Inventory – Revised (OCI-R; as described in Wootton et al., 2015). Participants in the control group were required to score below the clinical cut-off for the HD, OCD, and mood measures. The data for those who scored above clinical cut-off levels on the PHQ and GAD-7, but below clinical cut-off scores on the HRS and OCI were not used within this study (n = 25). In addition, 22 participants were excluded for the following reasons: did not complete the study (n = 10); did not provide consent (n = 1); inaccurate responses (n = 2; e.g., complete

responses with a completion time of <2 minutes, responding with the same option throughout), disclosed a neurological condition (n = 9). Forty-seven participants were therefore allocated to the HD group, 29 in the OCD group, and 44 in the Control group

Measures

Independent variable measures

Hoarding Rating Scale Self-Report (HRS-SR; Tolin et al., 2010). The HRS is a five-item measure of hoarding behaviour. Items are rated on a 9-point Likert scale ranging from "0 – no problem" to "8 - extreme". Questions focus on the three factors of HD: difficulty discarding, excessive acquisition, and clutter. Scores of 14 or higher are suggestive of the presence of HD. The measure has demonstrated a Cronbach's α of between .87 and .97 for internal consistency, and excellent test-retest reliability (r = .96; Tolin et al., 2010). In the present study internal consistency for the HRS-SR was excellent (Cronbach's α = .90). The HRS-SR has shown to be a useful and valid assessment of hoarding symptoms when used online (Nutley et al., 2020).

Obsessive-Compulsive Inventory – Revised (OCI-R; Foa et al., 1998). The OCI-R is an 18-item self-report scale for assessing symptoms of OCD. Respondents rate each statement on a 5-point Likert scale (0 – Not at all, 4 – Extremely). The recommended cut-off score is 21, with scores at or above this level indicating the likely presence of OCD. Overall, the OCI-R has demonstrated excellent internal consistency (α = .94) and test-retest reliability (*r* = 0.82) (Foa et al., 1998). However, the OCI-R comprises three HD related items. Wootton et al. (2015) modified the OCI-R scoring criteria to create two subscales (OCI-OCD and OCI-HD) to differentiate between OCD and HD. The OCI-HD subscale includes three items (1, 7, and 13) with scores ranging from 0-12. The OCI-OCD scale includes 15 items with scores ranging from 0-60. To measure the presence of OCD without hoarding behaviour, the OCI-OCD scale was used as an independent variable for the current study. In order to balance

sensitivity and specificity, a cut-off score for the OCI-OCD was recommended as 12 (sensitivity = .82, specificity = .83). The OCI-HD cut-off score was recommended as 6 (sensitivity = .92, specificity = .93). Internal consistency for both scales was high (OCI-OCD Cronbach's α = .92, OCI-HD Cronbach's α = .94). In the present study there was excellent internal consistency for the OCI-OCD subscale (Cronbach's α = .95); good internal consistency for the OCI-HD subscale (Cronbach's α = .85); and excellent internal consistency for the OCI-R total scores (Cronbach's α = .95).

Clinical measures

Patient Health Questionnaire - 9 (PHQ-9; Kroenke, 2001). The PHQ-9 is a nine-item measure assessing depression in clinical and non-clinical populations, used widely in primary care settings. Respondents rate nine items on a four-point Likert scale ranging from 0 (Not at all) to 3 (Nearly every day). Statements are rated based on how often the respondent has experienced or "*been bothered by"* the problems rated in each statement. The PHQ-9 has a recommended cut-off score of ten. A score of ten or above indicates the presence of clinical depression. Kroenke et al. (2001) reported good internal consistency (Cronbach's alpha = .86 - .89), in addition to good sensitivity (*r* = .88) and specificity (*r* = .88), and test-retest reliability (*r* = .84) when measuring Major Depressive Disorder. In the present study there was excellent internal consistency (α = .91).

Generalised Anxiety Disorder – 7 (GAD-7; Spitzer, 2006). The GAD-7 is a seven-item measure of generalised anxiety symptoms. Respondents rate seven statements targeting experiences of anxiety in the last two weeks. Scored on a four-point Likert scale ranging from 0 (Not at all), to 3 (Nearly every day), a score of 10 or above is indicative of the presence of moderate to severe anxiety. Sensitivity and specificity have been shown to be acceptable when assessed for generalised anxiety disorder (GAD), panic disorder, and social anxiety (*r* =

.72 - .89). Cronbach's alpha is reported as excellent (α = .92; Spitzer et al., 2006; Kroenke et al., 2007). In the present study there was excellent internal consistency (α = .92)

Dependent variable measures

Relationship Scales Questionnaire (RSQ; Griffin & Bartholomew, 1994). The RSQ is a 30-item measure which respondents rate the extent to which they agree with each statement on a five-point Likert scale. The RSQ is designed to measure attachment to others in general relationships, familial and romantic relationships. The RSQ includes four subscales which correspond to four attachment styles (Secure, Fearful, Preoccupied/Anxious, and Dismissing/Avoidant). Additionally, the RSQ targets both the mode of self and model of others. In order to capture both attachment to others and the self, scoring was modified in line with the method used in Danet and Secouet (2018). This method scores the self-model by adding the secure and avoidant subscale scores and subtracting the total of fearful and preoccupied scores. Higher, positive scores indicate a more positive model of self, whereas lower, negative scores are indicative of a more negative model of the self. Similarly, the other-model score is calculated by adding the secure and preoccupied subscale scores and subtracting the total of the fearful and dismissing scores. Higher, positive scores indicate a positive model of others, whereas lower, negative scores indicate a negative model of others. Internal consistency is not reported in the original paper (Griffin & Bartholomew, 1994) but has been reported as good (α = .83 in Stein et al., 2002) In the present study there was excellent internal consistency (α = .94).

Reciprocal Attachment Questionnaire – Adapted (RAQ-A; Nedelisky & Steele, 2009). The RAQ-A is a modified version of the Reciprocal Attachment Questionnaire (RAQ; West et al., 1987). The RAQ is a well validated measure of interpersonal attachment and was modified to measure attachment to objects and belongings (Nedelisky & Steele, 2009). For the RAQ-A, the human subject in the original RAQ was substituted with 'belongings' to

explore attachment to objects. The RAQ-A removed 44 items due to the questions not translating to objects from a human subject, and seven items were included to augment the existing subscales in the assessment of object attachment. The RAQ-A is a 38-item measure scored using a 5-point Likert scale. It assesses inanimate object security (17-items, four subscales), attachment patterns (20 items, four subscales), and the use of the attachment relationship to inanimate objects (one item). Following reverse scoring for relevant items, a total score was used for analysis to measure overall object attachment. Internal consistency for the adjusted measure is reported as good (α = .89). In the present study there was acceptable internal consistency (α = .78)

Procedure

Ethical approval was granted by Cardiff University School of Psychology Ethics Committee and the researchers abided by the BPS Code of Human Research Ethics (BPS, 2014).

Participants were sent a secure link to Qualtrics online survey software via email to access the study materials. Participants were able to download an electronic copy of the information sheet and debrief form from the survey site. After providing informed consent, participants then completed the questionnaires. The diagnostic questionnaires (HRS-SR, OCI-R, PHQ, and GAD-7) were presented in order, with the RSQ and RAQ-A randomised for each participant to mitigate any order effects.

Data analysis plan

A priori power analysis was conducted using G*Power 3.1 (Faul et al., 2007) to estimate the required sample size to detect a medium effect size (*Cohen's* F^2 = 0.0625). For MANOVA Global effects, 135 participants were required to achieve 80% power (β = .80, α = .05). The data was checked in relation to MANOVA test assumptions, including normality,

collinearity, outliers, homogeneity of variance-covariance matrices. No outliers were found from exploration of the data and all but one assumption was met; the total RAQ-A score violated the assumption of equality of variances. Therefore, Pillai's trace was used as it is a more robust test when any violations are present (Pallant, 2010).

To test the study hypotheses, a one-way between-groups Multivariate Analysis of Variance (MANOVA) was performed with group (HD, OCD, Control) as the independent variable. Dependent variables were Self Model (SM), Other Model (OM) and Object Attachment (OA). Follow-up Tukey's Honestly Significant Difference (HSD) tests were conducted to identify between-group differences.

Results

A total sample of 120 participants completed the questionnaires and were included in the study. Forty-seven were placed into the HD group, 29 in the OCD group, and 44 in the Control group. Ninety-eight percent (n = 46) of participants in the HD group scored above the recommended cut-off on the OCI-R measure for OCD, with one participant scoring below the cut-off. Therefore, consideration must be made when interpreting the results as only one participant met criteria for "pure" HD based on measures used.

Descriptive statistics

Demographic and descriptive data are displayed in Table 1. A one-way Analysis of Variance (ANOVA) was used to detect any differences in age across the three groups. The ANOVA found a significant difference between groups ($F = 6.03$, $p = .003$) and subsequent comparisons using Tukey's HSD follow up test found a significant difference for age between the HD, OCD and Control groups ($p < .05$). There was no significant difference in age between the OCD and Control groups.

Chi-Square tests were utilised to explore group differences on categorical variables: gender, ethnicity, relationship status, living situation and education level. All variables violated the assumption of expected count required for Chi-Squared analyses. Therefore, Likelihood Ratio is reported in place of Pearson Chi-Square. Results from the analysis showed no association between Gender and Group (X^2 (4, N = 120) = 4.69, p = .403), Education level and Group (X^2 (10, N = 120) = 15.99, p = .100), and Ethnicity and Group (X^2(14, N = 120) = 22.49, p = .069). Significant associations were found between Relationship status and Group (X^2 (10, N = 120) = 23.08, p = .01) and Living situation and Group (X^2 (8, N = 120) = 21.14, p = .007). The P value was adjusted using Bonferroni correction in order to control for the inflated error rate associated with multiple comparisons, therefore, for post-hoc tests, the P value was set at p = 0.0028 for Relationship Status analysis, and p = 0.003 for living situation analysis. Following post-hoc analysis using adjusted Z-Scores as recommended by Beasley and Schumacker (1995), no significant associations between Relationship Status and Group (p > .0028) or Living Situation and Group (p > .003) were found.

Table 2 displays mean and standard deviations for all measures and groups. Multiple one-way ANOVAs were utilised to explore differences in diagnostic measures between groups. Tukey's post-hoc tests indicated a significant difference for HRS-SR total scores between HD and OCD, and HD and Control groups (p < .001). No significant difference was observed between the OCD and Control groups. For OCI-OCD scores, significant differences were found between all groups (p < .004), with the HD scoring higher than OCD and Controls. For the PHQ-9 and GAD-7 scores, significant differences were found between all groups, with the HD group again showing higher scores on both measures than Control and OCD (all $p \leq .01$).

Table 1:

Demographics by group

		HD (n = 47)	OCD (n = 29)	Control (n =44)
Age	Mean (SD)	27.98 (9.83)	21.95 (5.09)	23.71 (7.15)
	Range	18.58 – 56.42	18.50 – 36.75	18.58 – 57.25
Gender	Male (%)	16 (34%)	5 (17.2%)	33 (75%)
	Female (%)	30 (63.8%)	23 (79.3%)	11 (25%)
	Gender non-conforming (%)	1 (2.1%)	1 (3.4%)	0 (0%)
Relationship	Single (%)	21 (44.7%)	19 (65.5%)	15 (34.1%)
	In a relationship (%)	12 (25.5%)	9 (31%)	20 (45.5%)
	Married (%)	11 (23.4%)	0 (0%)	6 (13.6%)
	Divorced/Separated (%)	2 (4.3%)	1 (3.5%)	1 (2.3%)
	Widowed (%)	1 (2.1%)	0 (0%)	0 (0%)
	Prefer not to say (%)	0 (0%)	0 (0%)	2 (4.5%)
Ethnicity	White (British or other) (%)	34 (72.3%)	23 (79.3%)	37 (84.1%)
	Black (including African, British, Caribbean) (%)	8 (17%)	1 (3.4%)	1 (2.3%)
	East Asian (inc. China) (%)	1 (2.1%)	1 (3.4%)	3 (6.8%)
	South Asian (Indian/Bangladeshi) (%)	3 (6.4%)	0 (0%)	1 (2.3%)
	Middle Eastern (%)	1 (2.1%)	1 (3.4%)	0 (0%)
	British Asian (%)	0 (0%)	1 (3.4%)	0 (0%)
	Mixed race (%)	0 (0%)	1 (3.4%)	2 (4.5%)
	Prefer not to say (%)	0 (0%)	1 (3.4%)	0 (0%)
Education level	GCSEs (%)	2 (4.3%)	0 (0%)	0 (0%)
	A-Levels or equivalent (%)	24 (51.1%)	22 (75.9%)	24 (54.5%)
	Undergraduate Degree (%)	16 (34%)	6 (20.7%)	11(25%)
	Master's Degree (%)	4 (8.5%)	1 (3.4%)	7 (15.9%)
	PhD/Doctorate (%)	0 (0%)	0 (0%)	2 (4.5%)
	Other (%)	1 (2.1%)	0 (0%)	0 (0%)
Living Situation	Alone (%)	8 (17%)	8 (27.6%)	7 (15.9%)
	Spouse/Partner (%)	15 (31.9%)	1 (3.4%)	12 (27.3%)
	House share (%)	21 (44.7%)	14 (48.3%)	18 (40.9%)
	Living with parents (%)	3 (6.4%)	1 (3.4%)	3 (6.8%)
	Other (%)	0 (0%)	5 (17.2%)	4 (9.1%)

Table 2:

Mean scores per group for all measures.

Measure	Group		
	HD (n = 47)	**OCD (n = 29)**	**Control (n = 44)**
	Mean (SD)	**Mean (SD)**	**Mean (SD)**
HRS	21.83 (5.24)	7.55 (3.31)	4.61 (3.64)
OCI-OCD	31.68 (10.77)	24.79 (11.63)	5.91 (3.04)
OCI	38.49 (11.89)	28.07 (12.80)	7.50 (3.74)
PHQ	14.36 (5.03)	10.41 (6.72)	4.18 (2.52)
GAD	12.23 (4.33)	9.24 (5.94)	3.11 (2.62)
RSQ SM	4.04 (7.54)	4.03 (5.99)	8.95 (5.83)
RSQ OM	-2.51 (7.44)	1.69 (9.64)	4.05 (7.59)
RAQ-A	111.32 (21.384)	78.24 (16.29)	68.20 (16.84)

Main analysis

The results from the MANOVA indicated a significant difference between groups, with a large effect size ($F = 16.58$, $p < .001$, partial eta squared = .300). Post-hoc tests (Tukey's HSD) found a significant difference between SM scores between the HD and Control groups *(*$p = .002$), and OCD and Control group *(*$p = .006$). No difference was found between the HD and OCD group *(*$p = 1.00$). For OM, a significant difference was found between HD and Control *(*$p < .001$), with no differences detected between further group comparisons (HD and OCD $p = .075$, OCD and Control $p = .444$). Significant differences were detected for OA between HD and Control *(*$p < .001$), and HD and OCD *(*$p < .001$) but no significant differences detected between the OCD and Control groups *(*$p = .067$). Table 3 displays mean difference and 95% confidence intervals from Tukey's HSD tests.

Table 3:

Mean differences and 95% confidence intervals from multi-comparisons using Tukey's HSD

Group		**Measure**		
		RSQ-Self	**RSQ-Other**	**RAQ-A**
HD	OCD	.01 [-3.69, 3.70]	-4.20 [-8.72, .32]	33.08 [22.63, 43.53]**
	Control	-4.91 [-8.19, -1.63]*	-6.56 [-10.58, -2.54]**	43.11 [33.83, 52.40]**
OCD	HD	-0.1 [-3.70, 3.69]	4.20 [-.32, 8.72]	-33.08 [-45.53, -22.63]**
	Control	-4.92 [-8.66, -1.18]*	-2.36 [-6.94, 2.23]	10.04 [-.55, 20.62]
Control	HD	4.91 [1.63, 8.19]*	6.56 [2.54, 10.58]**	-43.11 [-52.40, -33.83]**
	OCD	4.92 [1.18, 8.66]	2.36 [-2.23, 6.94]	-10.04 [-20.62, .55]

**Mean difference is significant at p < .05; **mean difference is significant at p < .001.*

Discussion

This research explored the model of the self, model of others, and attachment to objects across three groups: Hoarding, OCD, and non-clinical controls. Three hypotheses were tested. In relation to the first hypothesis, model of other scores were significantly lower in the HD group compared to controls, with no significant differences between OCD and HD, and OCD and control found. This suggests that those with HD have a significantly more negative view of others compared to a healthy control group, whereas no difference in scores between HD and OCD groups suggests this may be a commonality between the two disorders, as described by Nedelisky and Steele (2009). Mean scores for the HD group were negative, highlighting the nature of differences between the OCD and Control groups, where both mean scores were positive, indicating a more positive model of others. Hypothesis one is therefore partially supported. In relation to the prediction that the model of self would differ between groups, the model of the self was found to be significantly different between the HD and Control groups, and OCD and Control groups. There were no significant differences between the HD and OCD groups. Table 2 displays the mean scores of self-model per group. The HD Self-Model mean scores are still positive in the HD and OCD group, meaning that those groups may still hold a positive view of others, albeit less positive than the controls in this sample. From these results, hypothesis two is not supported. In relation to the third hypothesis, that object attachment would be significantly higher in the HD group, results supported this hypothesis, and it was observed that attachment to objects was higher in the HD group, compared to both OCD and Control groups. These findings suggest that those with HD hold a higher level of attachment towards their possessions (such as seeking proximity and using objects as sources of comfort or care) compared to OCD and Control participants. Object attachment was not significantly different between the OCD and Control groups, suggesting that attachment to possessions is a unique factor of HD within this sample.

These results strengthen the argument that objects may play a role in compensating for poor relationships with others (see Mathes et al., 2020). Objects may provide a source of comfort and may play a role in self-regulatory behaviours in HD (Nedelisky & Steele, 2009) which may compensate for negative self and other models. However, when focusing on the model of self, no differences were found in scores with scores being almost identical between the HD and OCD groups. In the current sample, there were no differences between the two clinical groups (OCD and HD) for model of the self. However, evidence from Frost et al. (2007) found that self-ambivalence led to higher acquisition of free items in a non-clinical population. The nature of the negative model of self found in the HD population may be an exaggerated example of this, where self-ambivalence or a negative model of self leads to an increase in acquisition, and when combined with a negative model of others, may lead to an increase in reliance or attachment to objects to compensate for the lack of certainty about the self and others. These findings suggest that, in line with the existing evidence for attachment in psychiatric populations, a negative model of the self may be a risk factor for developing psychiatric disorders including HD and OCD, but it is not unique to these disorders. The findings are also in line with those found by Danet and Secouet in their study on females in France (Danet & Secouet, 2018), where a negative model of the self is significantly related to the severity of hoarding (r = -0.33, p = .001). Danet and Secouet's findings showed a more negative view of the self within their HD group with a mean score of 2.46 (SD = 4.80) compared to a mean of 4.04 (SD = 7.54) in the present study. Sampling differences may account for these observations, as Danet and Secouet's sample was investigating HD in females only. The finding that the model of others was similar in the OCD and HD groups is in line with evidence that attachment difficulties are risk factors for a range of psychiatric disorders (e.g., Ein-Dor & Doron, 2015) and is supported by the evidence summarised in Mathes et al. (2020), which observed a higher prevalence of insecure attachment styles to

others in both an HD and OCD population. The idea of those with HD having "thwarted interpersonal needs" is reflected in the current findings, in that those with HD are more likely to experience social isolation and further difficulties with interpersonal relationships. However, these do not distinguish the nature of the difference between HD and OCD when relationships with others are considered. Interestingly, Danet and Secouet (2018) reported no significant relationship between model of others and HD severity, reporting a correlation coefficient of $r = 0.002$. From the existing evidence and evidence presented in this study, it appears that whilst those with HD do have a more negative model of others compared to healthy controls, these negative models are not exclusive to HD.

The findings in this study suggest that those with HD hold a negative view of others, in that they are likely to experience others as untrustworthy. Whilst this study did not take into consideration overall attachment styles (secure, fearful, avoidant, anxious), the self- and other model of attachment has been able to delineate views of the self and others in HD and OCD, providing further insight into the nature of attachment in HD, OCD and Control groups. The results in the present study also show comparable findings to those found by Danet and Secouet (2018). In the current sample, the mean score for model of others was -2.51 (SD = 7.44), whilst Danet and Secouet reported a mean score of -3.54 (SD = 4.85). This suggests that this sample had a more positive view of others overall, compared to that of the French female sample from Danet and Secouet. This is the first study to compare these constructs directly between these populations. As Grisham et al. (2009) also highlighted, and as observed in this study, a higher level of attachment to objects does not necessarily indicate the presence of HD. OCD scores were also higher compared to the control group, although this did not reach significance ($p = .67$).

Strengths and Limitations

There are a number of limitations to be noted for this study. As highlighted in the results section, almost all participants in the HD group had elevated scores on the OCD measure, which has the potential to contaminate the HD group and makes it difficult to establish clear boundaries between OCD and HD. Whilst this may raise concerns about the 'purity' of the HD group, the results highlight differences in object attachment scores between the HD and OCD groups, suggesting that HD was the factor influencing these differences, beyond OCD scores. However, the lack of significant difference found between the HD and OCD groups (for other and self attachment) may be attributable to the comorbid HD and OCD. The primary focus of this study was to explore relationships with the self, others, and objects in HD, OCD, and healthy controls. It is uncommon for participants to experience a single psychological problem, and it is a challenge of psychological research and recruitment to recruit participants without comorbid problems. The recruitment methods used online tools (e.g., university recruitment, social media, and a website for recruiting participants) which may play a part in the number of comorbid HD and OCD participants recruited. Future research could attempt to mitigate any effects of recruitment bias through more targeted recruitment methods such as local authorities, hoarding forums and support services such as third sector organisations for those living with HD. More in-depth methods of assessment, such as clinical interviews, may be more suitable for future research, where primary problems and comorbidities can be explored and disentangled for group allocation and interpretation of results. There are group differences in this paper, which suggest that those with HD have a higher level of object attachment compared to both OCD and Control participants. However, there are no significant differences on self and other attachment between the HD and OCD groups. Therefore, future research would benefit from disentangling these further to explore any potential group differences where the HD group does not comprise of participants

experiencing the same presenting problem as the clinical control group (where OCD has in the current paper).

A further potential threat to the internal validity of the findings was that participants in this study were self-selecting. Participants were recruited from online research forums, or were university undergraduates required to take part in research to fulfil course requirements. This may limit the generalisability of the research findings, especially given the focus on relationships. The group differences found in this sample may not be reflected in a non-research sample, where a wider range of relationship styles may present and would contribute to a deeper understanding of the nature of relationships and hoarding in the 'real world'. However, this sample does highlight variation in relationships to the self and others in this population. This is a limitation of much of the published psychological literature where volunteers take part in research. Woody et al. (2020) highlight the discrepancy between those who take part in research and those who do not. They described that research volunteers have a different demographic profile and have less severe conditions in the home compared to hoarders who do not volunteer. This has implications for hoarding research, and stronger researcher-community links are recommended to improve representativeness in hoarding research. The nature of online data collection allows for anonymity, which has been shown to positively impact engagement with tasks (Barr, 2017). Therefore, it is possible that the data collection method used in this study may improve accessibility and engagement in research, particularly when focusing on relationships with others and the self.

Statistical power may have been insufficient between groups, as the OCD group contained fewer participants than HD and Controls. However, the results in this sample suggest there are no significant differences of model of others between HD and OCD samples. Further research would benefit from including equal sample sizes which may uncover any differences. Another limitation may be the use of the method of quantifying

attachment models of self and other, whilst this allows us to explore the model of others and model of self in terms of the IWM and relationships, a more in-depth assessment of attachment styles may have benefitted this study.

Mean scores on the HRS-SR were comparable to other studies. For example, Mataix-Cols et al. (2013) reported a mean score of 27.36 (SD = 7.05) in their HD group, and Mogan et al. (2012) reported a mean score of 24.74 (SD = 9.51) in their HD sample. In the present study, mean HRS-SR scores were 21.83 (SD = 5.24). This alignment with existing research shows that participants with HD and OCD have comparable HRS-SR scores to those with HD alone suggesting similar levels of severity of HD across different samples.

This study also recruited a sample that is representative of the population in the United Kingdom in regard to participants' ethnicity (Office for National Statistics, 2021). Whilst there is a lack of culturally diverse research exploring HD (see Fernandez de la Cruz, 2016 for a review), this study presents a sample representative of the population in the United Kingdom.

Clinical and Research Implications

These findings add to the existing evidence that those with HD are more likely to find themselves in a perpetuating cycle of social isolation and poorer relationships with others. Davidson et al. (2020) highlighted that those with HD are more likely to experience feelings of shame, social isolation, and receive less support from their relationships compared to others. This lack of support and isolation may lead to a negative view of others, viewing them as unreliable, and therefore may lead to an increase in reliance on objects for reassurance and comfort. Treatment strategies could incorporate building positive personal relationships and relationship with the self, helping the individual with HD develop a more positive model of self. Interventions such as Compassion Focused Therapy (CFT), where self-compassion is a

key feature have been shown to be effective when working with HD (e.g., Chou et al., 2019). A focus on interpersonal factors in HD may provide a foundation for which parting with objects is easier for those with HD through an indirect weakening of attachment to objects.

The findings from this study highlight the nature of attachment to objects in HD. This finding should inform those who work with individuals with HD therapeutically so as not to focus primarily on the distress associated with hoarding, but the meaning of the objects to the individual. With a focus on the level of attachment to objects and relationships as a whole, a holistic understanding of the individual's needs can be built which can encompass not only hoarding symptoms, but also address broader attachment-related problems faced by these individuals.

Further research would benefit from longitudinal studies which explore any changes in attachment to the self, others, and objects over time. Understanding how these attachments can change over time can provide valuable insights into the progression of hoarding behaviour, and possibly aid in the early intervention of those at risk of developing hoarding. For example, longitudinal studies could explore the interaction of relationships with others and where an individual feels less connected to others, their reliance on objects for safety may increase, and vice versa. Additionally, a more in-depth assessment of comorbidities and attachment and a more 'pure' sample of HD participants could build on the findings from this study to provide more support for the role of attachment to others, the self, and objects in HD. Exploration of cognitive aspects of object attachment would also be beneficial, as the meaning of objects may differ for each individual. Qualitative research would be suggested to explore in-depth the role that objects play in compensating for difficulties in attachment to others and the relationship one has with the self.

Conclusion

The findings from the present study support the CB model of HD in Mathes et al. (2020). A negative model of the self can be integrated into "Maladaptive Cognitions" of the model, as one can hold negative views of the self, such as being unlovable or unworthy, contributing to the negative cognitions of the self. The negative model of self can also be attributed to dysfunctional attachments. It is important to reiterate that this finding is not unique to HD, therefore further research is needed to distinguish whether there is in fact a unique role of a negative model of the self in HD.

This study aimed to explore the nature of relationships with others, the self, and objects in HD compared to non-clinical controls and OCD participants. Findings suggest there is a role of negative models of self and others in HD, alongside a heightened level of object attachment. However, no significant differences were observed in the self or other models between the OCD and HD group.

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Impact Statement and Commentary

My experience conducting research and service evaluations has covered many topics, including specialist weight management, impulsivity, and evaluating group programs. My clinical experience has also been varied, ranging from clinical health, acute mental health, and community mental health settings. I have always been interested in developing new services and programs in my clinical work, which is what drew me to exploring Hoarding Disorder, as it is a relatively new classification in the DSM-5, and therefore is under-represented in the research literature compared to other disorders. Throughout my career, I have noticed the importance of building relationships with others, and this helped me choose the topic for my empirical paper. I found a gap in the literature that led me to exploring relationships with the self, others, and attachment to objects in HD. For my systematic review, I noticed that there were no systematic reviews on the impact of culture on HD. I have been interested in the role of culture on the development of mental health problems for a long time, as experiences of mental health problems may be similar, the different ways cultures across the world interpret these disorders has been something I have been keen to explore in a formal way. This review provided me with the opportunity to explore an under-researched disorder across non-Western cultures.

One significant barrier I faced was the impact of the COVID-19 pandemic on the commencement of my course. Whilst the pandemic did not directly impact the research process, the personal impacts of the pandemic meant that the process was much more difficult due to the lack of social support, uncertainty and anxieties about the pandemic, and lack of contact with other trainees.

Data collection is a pivotal phase of any research project, and it is often accompanied by its fair share of challenges. In my research, I was lucky to have recruited participants

online, which allowed for the research to take place remotely, without the need for meeting face-to-face, minimising the impact of the COVID-19 pandemic. There were some challenges that were faced, especially during January 2023. However, these were overcome, and I was able to continue with my data collection and achieved a substantial response rate. Whilst the sample size did recruit enough to generate sufficient power, unequal group sizes meant that the OCD group fell short of the ideal number of participants, meaning some of the results approached significance and may therefore affect the generalizability of my findings.

The guidance and support of my supervisor, Dr James Gregory played a crucial role in the research process. James has been instrumental in providing valuable insights, methodological advice, and constructive feedback throughout this process. His expertise and encouragement have been invaluable in refining my research approach, improving data analysis techniques, and ensuring the overall quality and rigor of my study.

One strength of my research lies in its focus on an underexplored area, shedding light on the nature of relationships in HD and summarising the existing literature on cultural differences in HD. Furthermore, the incorporation of rigorous research methods, such as standardized assessments and statistical analysis, enhances the credibility of my findings, despite the difference in group sizes in my empirical study. The cross-sectional nature of my study design presents a limitation, preventing me from establishing predictors of HD in terms of relationships. A clinical sample of hoarders would have been beneficial to the study, as findings would be more appropriate to generalise to a clinical population. However, the study utilised a well validated measure of HD and OCD to group participants, meaning the results could be applied to clinical settings. Despite its limitations, my research holds relevance and implications for clinical practice, service development, and society. By shedding light on the nature of relationships and HD, it has the potential to inform therapeutic interventions and

preventive measures. The findings may guide mental health professionals in tailoring treatments and support services for individuals with HD, ultimately improving patient outcomes.

In addition to submitting my project for publication, I will ensure these results are held in mind moving forward. The importance of building positive relationships with professionals and service users alike, will continue to be a value I hold and enact when working as a clinical psychologist.

Appendices

Appendix A:

Search terms for PubMed, EMBase, PsycINFO, and MEDLINE.

1. Hoard*
2. Cultur*
3. Belie*
4. Societ*
5. Collectiv*
6. Individualist*
7. Ethno*
8. Transcultur*
9. Europ*
10. Africa*
11. America*
12. Asia*
13. Austral*
14. Oceana
15. 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15
16. 1 and 15

Appendix B:

Mixed Method Appraisal Tool (MMAT) table

Part I: Mixed Methods Appraisal Tool (MMAT), version 2018

1. **The Prevalence of Compulsive Buying and Hoarding Behaviours in Emerging, Early, and Middle Adulthood: Multicentre Epidemiological Analysis of Non-clinical Chinese Samples Ye et al 2021**

Category of study designs	**Methodological quality criteria**	**Responses**			
		Yes	**No**	**Cant tell**	**Comments**
Screening questions (for all types)	S1. Are there clear research questions?	**x**			
	S2. Do the collected data allow to address the research questions?	**x**			
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the research question?	**x**			
	4.2. Is the sample representative of the target population?	**x**			
	4.3. Are the measurements appropriate?	**x**			
	4.4. Is the risk of nonresponse bias low?	**x**			
	4.5. Is the statistical analysis appropriate to answer the research question?	**x**			

2. **Clinically significant hoarding in obsessive-compulsive disorder: results from an Indian study Chakraborty et al 2012**

Category of study designs	**Methodological quality criteria**	**Responses**			
		Yes	**No**	**Cant tell**	**Comments**
Screening questions (for all types)	S1. Are there clear research questions?	**x**			

	S2. Do the collected data allow to address the research questions?	**x**			
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the research question?	**x**			
	4.2. Is the sample representative of the target population?	**x**			
	4.3. Are the measurements appropriate?	**x**			
	4.4. Is the risk of nonresponse bias low?		**x**		**Participants unable to take part may have had reasons for this pertinent to the variables of interest**
	4.5. Is the statistical analysis appropriate to answer the research question?	**x**			

3. Clinical Features and Treatment Characteristics of Compulsive Hoarding in Japanese Patients with Obsessive-Compulsive Disorder Matsunaga et al 2012

Category of study designs	**Methodological quality criteria**	**Responses**			
		Yes	**No**	**Cant tell**	**Comments**
Screening questions (for all types)	S1. Are there clear research questions?	**x**			
	S2. Do the collected data allow to address the research questions?	**x**			
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the research question?	**x**			
	4.2. Is the sample representative of the target population?	**x**			
	4.3. Are the measurements appropriate?	**x**			

	4.4. Is the risk of nonresponse bias low?		**x**		**This is referred to in the discussion**
	4.5. Is the statistical analysis appropriate to answer the research question?	**x**			

4. An exploratory study on the lived experiences of hoarding in Singapore Subramaniam et al 2020

Category of study designs	**Methodological quality criteria**	**Responses**			
		Yes	**No**	**Cant tell**	**Comments**
Screening questions (for all types)	S1. Are there clear research questions?	**x**			
	S2. Do the collected data allow to address the research questions?	**x**			
1. Qualitative	1.1. Is the qualitative approach appropriate to answer the research question?	**x**			
	1.2. Are the qualitative data collection methods adequate to address the research question?	**x**			
	1.3. Are the findings adequately derived from the data?	**x**			
	1.4. Is the interpretation of results sufficiently substantiated by data?	**x**			
	1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?	**x**			

5. A transcultural study of hoarding disorder: Insights from the United Kingdom, Spain, Japan, and Brazil Nordsletten et al 2018

Category of study designs	**Methodological quality criteria**	**Responses**			
		Yes	**No**	**Cant tell**	**Comments**
Screening questions (for all types)	S1. Are there clear research questions?	**x**			

	S2. Do the collected data allow to address the research questions?	**x**			
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the research question?	**x**			
	4.2. Is the sample representative of the target population?	**x**			
	4.3. Are the measurements appropriate?	**x**			**variation in the assessment of clutter.**
	4.4. Is the risk of nonresponse bias low?	**x**			
	4.5. Is the statistical analysis appropriate to answer the research question?	**x**			

6. Hoarding among outpatients seeking treatment at a psychiatric hospital in Singapore Ong et al 2016

Category of study designs	**Methodological quality criteria**	**Responses**			
		Yes	**No**	**Cant tell**	**Comments**
Screening questions (for all types)	S1. Are there clear research questions?	**x**			
	S2. Do the collected data allow to address the research questions?	**x**			
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the research question?	**x**			
	4.2. Is the sample representative of the target population?	**x**			
	4.3. Are the measurements appropriate?	**x**			**Some reliance on self-report measures**
	4.4. Is the risk of nonresponse bias low?	**x**			
	4.5. Is the statistical analysis appropriate to answer the research question?	**x**			

7. The Relationship Between Compulsive Buying and Hoarding in China: A Multicenter Study He et al 2021

Category of study designs	Methodological quality criteria	Responses			
		Yes	No	Cant tell	Comments
Screening questions (for all types)	S1. Are there clear research questions?	**x**			
	S2. Do the collected data allow to address the research questions?	**x**			
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the research question?	**x**			
	4.2. Is the sample representative of the target population?	**x**			
	4.3. Are the measurements appropriate?	**x**			**reliance on self-report measures**
	4.4. Is the risk of nonresponse bias low?	**x**			
	4.5. Is the statistical analysis appropriate to answer the research question?	**x**			

8. A consideration of hoarding disorder symptoms in China Timpano et al 2015

Category of study designs	Methodological quality criteria	Responses			
		Yes	No	Cant tell	Comments
Screening questions (for all types)	S1. Are there clear research questions?	**x**			
	S2. Do the collected data allow to address the research questions?	**x**			
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the research question?		**x**		**All participants were students and therefore not representative of general population of China. This is referred to.**
	4.2. Is the sample representative of the target population?		**x**		
	4.3. Are the measurements appropriate?	**x**			

	4.4. Is the risk of nonresponse bias low?	**x**			
	4.5. Is the statistical analysis appropriate to answer the research question?	**x**			

9. Cognitive correlates of hoarding symptoms: An exploratory study with a non-Western community sample Yorulmaz and Demirhan 2015

Category of study designs	**Methodological quality criteria**	**Responses**			
		Yes	**No**	**Cant tell**	**Comments**
Screening questions (for all types)	S1. Are there clear research questions?	**x**			
	S2. Do the collected data allow to address the research questions?	**x**			
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the research question?		**x**		**Only recruited those in employment**
	4.2. Is the sample representative of the target population?			**x**	**Not clear if only focused on working Turkish adults**
	4.3. Are the measurements appropriate?	**x**			
	4.4. Is the risk of nonresponse bias low?	**x**			**Anonymity in work place**
	4.5. Is the statistical analysis appropriate to answer the research question?	**x**			

10. Clinical characteristics of hoarding disorder in Japanese patients Kuwano et al 2020

Category of study designs	**Methodological quality criteria**	**Responses**			
		Yes	**No**	**Cant tell**	**Comments**
Screening questions (for all types)	S1. Are there clear research questions?	**x**			
	S2. Do the collected data allow to address the research questions?	**x**			
4. Quantitative	4.1. Is the sampling strategy relevant to address the research question?	**x**			

descriptive					
	4.2. Is the sample representative of the target population?	**x**			
	4.3. Are the measurements appropriate?	**x**			
	4.4. Is the risk of nonresponse bias low?	**x**			
	4.5. Is the statistical analysis appropriate to answer the research question?	**x**			

11. Relationship Between Autistic Traits And Hoarding In A Large Non-Clinical Chinese Sample: Mediating Effect Of Anxiety And Depression Xu et al 2015

Category of study designs	**Methodological quality criteria**	**Responses**			
		Yes	**No**	**Cant tell**	**Comments**
Screening questions (for all types)	S1. Are there clear research questions?	**x**			
	S2. Do the collected data allow to address the research questions?	**x**			
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the research question?		**x**		**All participants were students and therefore not representative of general population**
	4.2. Is the sample representative of the target population?		**x**		
	4.3. Are the measurements appropriate?	**x**			
	4.4. Is the risk of nonresponse bias low?			**x**	**Refusal to participate/respond not explored – may be pertinent to some of the variables**
	4.5. Is the statistical analysis appropriate to answer the research question?	**x**			

Appendix C:

Submission Guidelines for Journal of Obsessive-Compulsive and Related Disorders

Article structure

Introduction

State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results. If the focus of the paper is on a disorder other than OCD (as defined in DSM-IV.TR), provide a rationale for including the disorder as an obsessive-compulsive related disorder (see Editorial Guidance section).

Methods

Provide sufficient detail to allow the work to be reproduced. Methods already published should be indicated by a reference: only relevant modifications should be described.

Theory/calculation

A Theory section should extend, not repeat, the background to the article already dealt with in the Introduction and lay the foundation for further work. In contrast, a Calculation section represents a practical development from a theoretical basis.

Results

Results should be clear and concise.

Discussion

This should explore the significance of the results of the work, not repeat them. Avoid extensive citations and discussion of published literature. Be sure to include limitations of the present study and suggestions for future research.

Conclusions

The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

Appendices

If there is more than one appendix, they should be identified as A, B, etc. Formulae and equations in appendices should be given separate numbering: Eq. (A.1), Eq. (A.2), etc.; in a subsequent appendix, Eq. (B.1) and so on. Similarly for tables and figures: Table A.1; Fig. A.1, etc.

Clinical reports and case histories

The Journal will consider clinical reports that articulate the treatment of OCD or related disorders using any theoretical framework (biological, behavioral, cognitive, gestalt, humanistic, psychodynamic, and others). Clinical reports should use the following format (maximum manuscript length is 30 pages in total):

1. Theoretical and Research Basis for the Treatment
2. Case Introduction (presenting complaints, history, etc.)
3. Assessment (what instruments were used [and justification if needed])
4. Case Conceptualization (discuss the clinician's thinking about the case and the treatment selection)
5. Course of Treatment and Assessment of Progress (Describe what happened during treatment and the outcome at post-treatment and follow up. If possible, use single case research design methodology; see Barlow, Nock, & Hersen [2009])
6. Complicating Factors (if any, including medical management)
7. Treatment Implications of the Case
8. Recommendations to Clinicians and Students

Shorter communications/Brief reports

This option is designed to allow publication of research reports that are not suitable for publication as regular articles. Shorter Communications or Brief Reports are appropriate for articles with a specialized focus or of particular didactic value. Manuscripts should be between 3000-5000 words, and must not exceed the upper word limit. This limit includes the abstract, text, and references, but not the title page, tables and figures.

Essential title page information

• ***Title.*** Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible.

• ***Author names and affiliations.*** Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. You can add your name between parentheses in your own script behind the English transliteration. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower-case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.

• ***Corresponding author.*** Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. This responsibility includes answering any future queries about Methodology and Materials. **Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author.**

• ***Present/permanent address.*** If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

Highlights

Highlights are mandatory for this journal as they help increase the discoverability of your article via search engines. They consist of a short collection of bullet points that capture the novel results of your research as well as new methods that were used during the study (if any). Please have a look at the examples here: example Highlights.

Highlights should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point).

Abstract

A concise and factual abstract is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential, then cite the author(s) and year(s). Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

Graphical abstract

Although a graphical abstract is optional, its use is encouraged as it draws more attention to the online article. The graphical abstract should summarize the contents of the article in a concise, pictorial form designed to capture the attention of a wide readership. Graphical abstracts should be submitted as a separate file in the online submission system. Image size: Please provide an image with a minimum of 531 × 1328 pixels (h × w) or proportionally more. The image should be readable at a size of 5 × 13 cm using a regular screen resolution of 96 dpi. Preferred file types: TIFF, EPS, PDF or MS Office files. You can view Example Graphical Abstracts on our information site.

Keywords

Immediately after the abstract, provide a maximum of 6 keywords, using American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, 'and', 'of'). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

Acknowledgements

Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

Formatting of funding sources

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, it is recommended to include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Math formulae

Please submit math equations as editable text and not as images. Present simple formulae in line with normal text where possible and use the solidus (/) instead of a horizontal line for small fractional terms, e.g., X/Y. In principle, variables are to be presented in italics. Powers of e are often more conveniently denoted by exp. Number consecutively any equations that have to be displayed separately from the text (if referred to explicitly in the text).

Footnotes

Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors build footnotes into the text, and this feature may be used. Should this not be the case, indicate the position of footnotes in the text and present the footnotes themselves separately at the end of the article.

Artwork

Electronic artwork

General points

• Make sure you use uniform lettering and sizing of your original artwork.

• Preferred fonts: Arial (or Helvetica), Times New Roman (or Times), Symbol, Courier.

• Number the illustrations according to their sequence in the text.

• Use a logical naming convention for your artwork files.

• Indicate per figure if it is a single, 1.5 or 2-column fitting image.

• For Word submissions only, you may still provide figures and their captions, and tables within a single file at the revision stage.

• Please note that individual figure files larger than 10 MB must be provided in separate source files.

A detailed guide on electronic artwork is available.

You are urged to visit this site; some excerpts from the detailed information are given here.

Formats

Regardless of the application used, when your electronic artwork is finalized, please 'save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/halftone combinations given below):

EPS (or PDF): Vector drawings. Embed the font or save the text as 'graphics'.

TIFF (or JPG): Color or grayscale photographs (halftones): always use a minimum of 300 dpi.

TIFF (or JPG): Bitmapped line drawings: use a minimum of 1000 dpi.

TIFF (or JPG): Combinations bitmapped line/half-tone (color or grayscale): a minimum of 500 dpi is required.

Please do not:

• Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); the resolution is too low.

• Supply files that are too low in resolution.

• Submit graphics that are disproportionately large for the content.

Color artwork

Please make sure that artwork files are in an acceptable format (TIFF (or JPEG), EPS (or PDF) or MS Office files) and with the correct resolution. If, together with your accepted article, you submit usable color figures then Elsevier will ensure, at no additional charge, that these figures will appear in color online (e.g., ScienceDirect and other sites) in addition to color reproduction in print. Further information on the preparation of electronic artwork.

Figure captions

Ensure that each illustration has a caption. A caption should comprise a brief title (**not** on the figure itself) and a description of the illustration. Keep text in the illustrations themselves to a minimum but explain all symbols and abbreviations used.

Tables

Please submit tables as editable text and not as images. Tables can be placed either next to the relevant text in the article, or on separate page(s) at the end. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules and shading in table cells.

References

Citation in text

Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

Web references

As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source

publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

Data references

This journal encourages you to cite underlying or relevant datasets in your manuscript by citing them in your text and including a data reference in your Reference List. Data references should include the following elements: author name(s), dataset title, data repository, version (where available), year, and global persistent identifier. Add [dataset] immediately before the reference so we can properly identify it as a data reference. The [dataset] identifier will not appear in your published article.

Preprint references

Where a preprint has subsequently become available as a peer-reviewed publication, the formal publication should be used as the reference. If there are preprints that are central to your work or that cover crucial developments in the topic, but are not yet formally published, these may be referenced. Preprints should be clearly marked as such, for example by including the word preprint, or the name of the preprint server, as part of the reference. The preprint DOI should also be provided.

References in a special issue

Please ensure that the words 'this issue' are added to any references in the list (and any citations in the text) to other articles in the same Special Issue.

Reference management software

Most Elsevier journals have their reference template available in many of the most popular reference management software products. These include all products that support Citation Style Language styles, such as Mendeley. Using citation plug-ins from these products, authors only need to select the appropriate journal template when preparing their article, after

which citations and bibliographies will be automatically formatted in the journal's style. If no template is yet available for this journal, please follow the format of the sample references and citations as shown in this Guide. If you use reference management software, please ensure that you remove all field codes before submitting the electronic manuscript. More information on how to remove field codes from different reference management software.

Reference formatting

There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the article number or pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct. If you do wish to format the references yourself they should be arranged according to the following examples:

Reference style

Text: Citations in the text should follow the referencing style used by the American Psychological Association. You are referred to the Publication Manual of the American Psychological Association, Seventh Edition, ISBN 978-1-4338-3215-4, copies of which may be ordered online.

List: references should be arranged first alphabetically and then further sorted chronologically if necessary. More than one reference from the same author(s) in the same year must be identified by the letters 'a', 'b', 'c', etc., placed after the year of publication.

Examples:

Reference to a journal publication:

Van der Geer, J., Hanraads, J. A. J., & Lupton, R. A. (2010). The art of writing a scientific

article. *Journal of Scientific Communications, 163*, 51–59. https://doi.org/10.1016/j.sc.2010.00372.

Reference to a journal publication with an article number:

Van der Geer, J., Hanraads, J. A. J., & Lupton, R. A. (2018). The art of writing a scientific article. *Heliyon, 19,* Article e00205. https://doi.org/10.1016/j.heliyon.2018.e00205.

Reference to a book:

Strunk, W., Jr., & White, E. B. (2000). *The elements of style* (4th ed.). Longman (Chapter 4).

Reference to a chapter in an edited book:

Mettam, G. R., & Adams, L. B. (2009). How to prepare an electronic version of your article. In B. S. Jones, & R. Z. Smith (Eds.), *Introduction to the electronic age* (pp. 281–304). E-Publishing Inc.

Reference to a website:

Powertech Systems. (2015). *Lithium-ion vs lead-acid cost analysis*. Retrieved from http://www.powertechsystems.eu/home/tech-corner/lithium-ion-vs-lead-acid-cost-analysis/. Accessed January 6, 2016

Reference to a dataset:

[dataset] Oguro, M., Imahiro, S., Saito, S., & Nakashizuka, T. (2015). *Mortality data for Japanese oak wilt disease and surrounding forest compositions*. Mendeley Data, v1. https://doi.org/10.17632/xwj98nb39r.1.

Reference to a conference paper or poster presentation:

Engle, E.K., Cash, T.F., & Jarry, J.L. (2009, November). *The Body Image Behaviours Inventory-3: Development and validation of the Body Image Compulsive Actions and Body Image Avoidance Scales*. Poster session presentation at the meeting of the Association for Behavioural and Cognitive Therapies, New York, NY.

Reference to software:

Coon, E., Berndt, M., Jan, A., Svyatsky, D., Atchley, A., Kikinzon, E., Harp, D., Manzini, G., Shelef, E., Lipnikov, K., Garimella, R., Xu, C., Moulton, D., Karra, S., Painter, S., Jafarov, E., & Molins, S. (2020, March 25). *Advanced Terrestrial Simulator (ATS) v0.88 (Version 0.88)*. Zenodo. https://doi.org/10.5281/zenodo.3727209.

Journal abbreviations source

Journal names should be abbreviated according to the List of Title Word Abbreviations.

Video

Elsevier accepts video material and animation sequences to support and enhance your scientific research. Authors who have video or animation files that they wish to submit with their article are strongly encouraged to include links to these within the body of the article. This can be done in the same way as a figure or table by referring to the video or animation content and noting in the body text where it should be placed. All submitted files should be properly labeled so that they directly relate to the video file's content. In order to ensure that your video or animation material is directly usable, please provide the file in one of our recommended file formats with a preferred maximum size of 150 MB per file, 1 GB in total. Video and animation files supplied will be published online in the electronic version of your article in Elsevier Web products, including ScienceDirect. Please supply 'stills' with your files: you can choose any frame from the video or animation or make a separate image. These will be used instead of standard icons and will personalize the link to your video data. For more detailed instructions please visit our video instruction pages. Note: since video and animation cannot be embedded in the print version of the journal, please provide text for both the electronic and the print version for the portions of the article that refer to this content.

Supplementary material

Supplementary material such as applications, images and sound clips, can be published with

your article to enhance it. Submitted supplementary items are published exactly as they are received (Excel or PowerPoint files will appear as such online). Please submit your material together with the article and supply a concise, descriptive caption for each supplementary file. If you wish to make changes to supplementary material during any stage of the process, please make sure to provide an updated file. Do not annotate any corrections on a previous version. Please switch off the 'Track Changes' option in Microsoft Office files as these will appear in the published version.

Research data

This journal requires and enables you to share data that supports your research publication where appropriate, and enables you to interlink the data with your published articles. Research data refers to the results of observations or experimentation that validate research findings. To facilitate reproducibility and data reuse, this journal also encourages you to share your software, code, models, algorithms, protocols, methods and other useful materials related to the project.

Below are a number of ways in which you can associate data with your article or make a statement about the availability of your data when submitting your manuscript. When sharing data in one of these ways, you are expected to cite the data in your manuscript and reference list. Please refer to the "References" section for more information about data citation. For more information on depositing, sharing and using research data and other relevant research materials, visit the research data page.

Data linking

If you have made your research data available in a data repository, you can link your article directly to the dataset. Elsevier collaborates with a number of repositories to link articles on

ScienceDirect with relevant repositories, giving readers access to underlying data that gives them a better understanding of the research described.

There are different ways to link your datasets to your article. When available, you can directly link your dataset to your article by providing the relevant information in the submission system. For more information, visit the database linking page.

For supported data repositories a repository banner will automatically appear next to your published article on ScienceDirect.

In addition, you can link to relevant data or entities through identifiers within the text of your manuscript, using the following format: Database: xxxx (e.g., TAIR: AT1G01020; CCDC: 734053; PDB: 1XFN).

Research Elements

This journal enables you to publish research objects related to your original research – such as data, methods, protocols, software and hardware – as an additional paper in a Research Elements journal.

Research Elements is a suite of peer-reviewed, open access journals which make your research objects findable, accessible and reusable. Articles place research objects into context by providing detailed descriptions of objects and their application, and linking to the associated original research articles. Research Elements articles can be prepared by you, or by one of your collaborators.

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More information can be found on the Research Elements page.

Data statement

To foster transparency, we encourage you to state the availability of your data in your submission. This may be a requirement of your funding body or institution. If your data is unavailable to access or unsuitable to post, you will have the opportunity to indicate why during the submission process, for example by stating that the research data is confidential. The statement will appear with your published article on ScienceDirect. For more information, visit the Data Statement page.

Appendix D

Ethical approval provided by Cardiff University School of Psychology Research Ethics Committee

Jack Arnold

From: psychethics
Sent: 15 February 2023 09:50
To: Jack Arnold
Cc: James Gregory
Subject: Ethics Feedback - EC.22.04.26.6567RA3

Dear Jack,

The Ethics Committee has considered your amended PG project proposal: Relationships with objects, others, and the self in Hoarding Disorder (EC.22.04.26.6567RA3).

Your amended project proposal has received a **Favourable Opinion** based on the information described in the proforma and supporting documentation.

Conditions of the favourable opinion
The favourable opinion is subject to the following conditions being met:

- You must retain a copy of this decision letter with your Research records.
- Please note that if any changes are made to the above project then you must notify the Ethics Committee.
- Please use the EC reference number on all future correspondence.
- The Committee must be informed of any unexpected ethical issues or unexpected adverse events that arise during the research project.
- The Committee must be informed when your research project has ended. This notification should be made to psychethics@cardiff.ac.uk within three months of research project completion.
- All data will be retained/processed/destroyed in line with University policy.

The Committee reminds you that it is your responsibility to conduct your research project to the highest ethical standards and to keep all ethical issues arising from your research project under regular review.

You are expected to comply with Cardiff University's policies, procedures and guidance at all times, including, but not limited to, its Policy on the Ethical Conduct of Research involving Human Participants, Human Material or Human Data and our Research Integrity and Governance Code of Practice.

Kind regards,
Deborah

School of Psychology Research Ethics Committee
https://cf.sharepoint.com/teams/InsidePsych/Ethics/

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Caerdydd
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Ffôn: +44(0)29 208 70707
E-bost: psychethics@caerdydd.ac.uk

Mae'r Brifysgol yn croesawu gohebiaeth yn Gymraeg neu yn Saesneg. Ni fydd gohebu yn Gymraeg yn creu unrhyw oedi.

Appendix E

Psychometric measures used for empirical research paper.

Hoarding Rating Scale Self-Report (HRS-SR; Tolin et al., 2010)

Hoarding Rating Scale (HRS)

Date: _____

1. Because of the clutter or number of possessions, how difficult is it for you to use the rooms in your home?

0 ---------- 1 ---------- 2 ---------- 3 ---------- 4 ---------- 5 ---------- 6 ---------- 7 ---------- 8

Not at all Difficult | Mild | Moderate | Severe | Extremely Difficult

2. To what extent do you have difficulty discarding (or recycling, selling, giving away) ordinary things that other people would get rid of?

0 ---------- 1 ---------- 2 ---------- 3 ---------- 4 ---------- 5 ---------- 6 ---------- 7 ---------- 8

Not at all difficult | Mild | Moderate | Severe | Extremely difficult

3. To what extent do you currently have a problem with collecting free things or buying more things than you need or can use or can afford? [Use the scale below]

0 ---------- 1 ---------- 2 ---------- 3 ---------- 4 ---------- 5 ---------- 6 ---------- 7 ---------- 8

No problem | Mild, occasionally (less than weekly) acquires items not needed, or acquires a few unneeded items | Moderate, regularly (once or twice weekly) acquires items not needed, or acquires some unneeded items | Severe, frequently (several times per week) acquires items not needed, or acquires many unneeded items | Extreme, very often (daily) acquires items not needed, or acquires large numbers of unneeded items

4. To what extent do you experience emotional distress because of clutter, difficulty discarding, or problems with buying or acquiring things?

0 ---------- 1 ---------- 2 ---------- 3 ---------- 4 ---------- 5 ---------- 6 ---------- 7 ---------- 8

None/not at all | Mild | Moderate | Severe | Extreme

5. To what extent do you experience impairment in your life (daily routine, job / school, social activities, family activities, financial difficulties) because of clutter, difficulty discarding, or problems with buying or acquiring things?

0 ---------- 1 ---------- 2 ---------- 3 ---------- 4 ---------- 5 ---------- 6 ---------- 7 ---------- 8

None/not at all | Mild | Moderate | Severe | Extreme

Obsessive-Compulsive Inventory – Revised (OCI-R; Foa et al., 1998)

Obsessive-Compulsive Inventory - Revised (OCI-R) (OCI-R)

Instructions:

The following statements refer to experiences that many people have in their everyday lives. Select the option that best describes how much that experience has distressed or bothered you during the PAST MONTH.

		Not at all	A little	Moderately	A lot	Extremely
1	I have saved up so many things that they get in the way.	0	1	2	3	4
2	I check things more often than necessary.	0	1	2	3	4
3	I get upset if objects are not arranged properly.	0	1	2	3	4
4	I feel compelled to count while I am doing things.	0	1	2	3	4
5	I find it difficult to touch an object when I know it has been touched by strangers or certain people.	0	1	2	3	4
6	I find it difficult to control my own thoughts.	0	1	2	3	4
7	I collect things I don't need.	0	1	2	3	4
8	I repeatedly check doors, windows, drawers, etc.	0	1	2	3	4
9	I get upset if others change the way I have arranged things.	0	1	2	3	4
10	I feel I have to repeat certain numbers.	0	1	2	3	4
11	I sometimes have to wash or clean myself simply because I feel contaminated.	0	1	2	3	4
12	I am upset by unpleasant thoughts that come into my mind against my will.	0	1	2	3	4
13	I avoid throwing things away because I am afraid I might need them later.	0	1	2	3	4
14	I repeatedly check gas and water taps and light switches after turning them off.	0	1	2	3	4
15	I need things to be arranged in a particular way.	0	1	2	3	4
16	I feel that there are good and bad numbers.	0	1	2	3	4

		Not at all	A little	Moderately	A lot	Extremely
17	I wash my hands more often and longer than necessary.	0	1	2	3	4
18	I frequently get nasty thoughts and have difficulty in getting rid of them.	0	1	2	3	4

Developer Reference:

Foa, E. B., Huppert, J. D., Leiberg, S., Langner, R., Kichic, R., Hajcak, G., & Salkovskis, P. M. (2002). The Obsessive-Complusive Inventory: Development and validation of a short version. Psychological Assessment, 14(4), 485–495. https://doi.org/10.1037//1040-3590.14.4.485

Patient Health Questionnaire - 9 (PHQ-9; Kroenke, 2001).

PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems? *(Use "✔" to indicate your answer)*	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

FOR OFFICE CODING 0 + _____ + _____ + _____

=Total Score: _____

Generalised Anxiety Disorder – 7 (GAD-7; Spitzer, 2006).

GAD-7 Anxiety

Over the last two weeks, how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious, or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid, as if something awful might happen	0	1	2	3

Column totals _____ + _____ + _____ + _____ =

Total score _____

If you checked any problems, how difficult have they made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
☐	☐	☐	☐

Source: Primary Care Evaluation of Mental Disorders Patient Health Questionnaire (PRIME-MD-PHQ). The PHQ was developed by Drs. Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke, and colleagues. For research information, contact Dr. Spitzer at ris8@columbia.edu. PRIME-MD® is a trademark of Pfizer Inc. Copyright© 1999 Pfizer Inc. All rights reserved. Reproduced with permission

Scoring GAD-7 Anxiety Severity

This is calculated by assigning scores of 0, 1, 2, and 3 to the response categories, respectively, of "not at all," "several days," "more than half the days," and "nearly every day."
GAD-7 total score for the seven items ranges from 0 to 21.

0–4: minimal anxiety

5–9: mild anxiety

10–14: moderate anxiety

15–21: severe anxiety

Relationship Scales Questionnaire (RSQ; Griffin & Bartholomew, 1994)

RSQ

Please read each of the following statements and rate the extent to which you believe each statement best describes your feelings about close relationships.

		Not at all like me		Somewhat like me		Very much like me
1.	I find it difficult to depend on other people.	1	2	3	4	5
2.	It is very important to me to feel independent.	1	2	3	4	5
3.	I find it easy to get emotionally close to others.	1	2	3	4	5
4.	I want to merge completely with another person.	1	2	3	4	5
5.	I worry that I will be hurt if I allows myself to become too close to others.	1	2	3	4	5
6.	I am comfortable without close emotional relationships.	1	2	3	4	5
7.	I am not sure that I can always depend on others to be there when I need them.	1	2	3	4	5
8.	I want to be completely emotionally intimate with others.	1	2	3	4	5
9.	I worry about being alone.	1	2	3	4	5
10.	I am comfortable depending on other people.	1	2	3	4	5
11.	I often worry that romantic partners don't really love me.	1	2	3	4	5
12.	I find it difficult to trust others completely.	1	2	3	4	5

13.	I worry about others getting too close to me.	1	2	3	4	5
14.	I want emotionally close relationships.	1	2	3	4	5

		Not at all like me		**Somewhat like me**		**Very much like me**
15.	I am comfortable having other people depend on me.	1	2	3	4	5
16.	I worry that others don't value me as much as I value them.	1	2	3	4	5
17.	People are never there when you need them.	1	2	3	4	5
18.	My desire to merge completely sometimes scares people away.	1	2	3	4	5
19.	It is very important to me to feel self-sufficient.	1	2	3	4	5
20.	I am nervous when anyone gets too close to me.	1	2	3	4	5
21.	I often worry that romantic partners won't want to stay with me.	1	2	3	4	5
22.	I prefer not to have other people depend on me.	1	2	3	4	5
23.	I worry about being abandoned.	1	2	3	4	5
24.	I am somewhat uncomfortable being close to others.	1	2	3	4	5
25.	I find that others are reluctant to get as close as I would like.	1	2	3	4	5
26.	I prefer not to depend on others.	1	2	3	4	5
27.	I know that others will be there when I need them.	1	2	3	4	5

28.	I worry about having others not accept me.	1	2	3	4	5
29.	Romantic partners often want me to be closer than I feel comfortable being.	1	2	3	4	5
30.	I find it relatively easy to get close to others.	1	2	3	4	5

Reciprocal Attachment Questionnaire – Adapted

The Reciprocal Attachment Questionnaire Adapted (RAQ-A).

For each statement, select the number that best reflects your response where 1 = not at all to 5 = very much so.

	Not at all				very much so
1. It's hard for me to believe that I'll always have my belongings	1	2	3	4	5
2. I have to have my belongings with me or nearby me when I'm upset	1	2	3	4	5
3. The further I am from my belongings, the more insecure I feel	1	2	3	4	5
4. I feel comfortable going away from my belongings for a few days	1	2	3	4	5
5. I get really angry at myself because I think taking care of my belongings takes up too much time	1	2	3	4	5
6. I can't get on with my work if my belongings are not the way I like them	1	2	3	4	5
7. My belongings often get in the way	1	2	3	4	5
8. I feel it is best not to depend on my belongings	1	2	3	4	5
9. I turn to my belongings for many things, including comfort and reassurance	1	2	3	4	5
10. I worry about losing my belongings	1	2	3	4	5
11. When I'm upset, the most important thing is to be surrounded by my belongings	1	2	3	4	5
12. Being with my belongings is my only source of security	1	2	3	4	5
13. The loss of my belongings would be difficult, but not the end of the world	1	2	3	4	5
14. I put the needs of my belongings before my own	1	2	3	4	5
15. I often feel too dependent upon my belongings	1	2	3	4	5

16. I enjoy being close to my belongings	1	2	3	4	5
17. I have a terrible fear that I will have to get rid of some of my belongings	1	2	3	4	5
18. I feel lost if I'm upset and my belongings are not around	1	2	3	4	5
19. I do not know how I would manage if I had to reduce the number of belongings in my life	1	2	3	4	5
20. I feel vulnerable when I am away from my belongings for a few days	1	2	3	4	5

Not at all very much so

21. I enjoy taking care of my belongings	1	2	3	4	5
22The amount of belongings in my home interferes with my life	1	2	3	4	5
23. I'm afraid I will lose my belongings	1	2	3	4	5
24. When I am anxious I desperately need to be close to my belongings	1	2	3	4	5
25. I feel much more insecure or vulnerable when I am away from my belongings	1	2	3	4	5
26. I protest strongly when I have to leave my belongings	1	2	3	4	5
27. I'm not the type to be a 'martyr' for my belongings	1	2	3	4	5
28. If I make a decision, I always check to see how it will affect my belongings	1	2	3	4	5
29. Having so many belongings in my life makes things difficult	1	2	3	4	5
30. Taking care of my belongings is not my mission in life	1	2	3	4	5
31. I do not need belongings in my life to feel safe	1	2	3	4	5
32. I don't make a fuss over my belongings	1	2	3	4	5
33. I would be helpless without my belongings	1	2	3	4	5
34. I don't sacrifice my own needs in order to take care of my belongings	1	2	3	4	5
35. I feel that the hardest thing to do is to stand on my own	1	2	3	4	5
36. It makes me feel better when I spend time taking care of my belongings	1	2	3	4	5
37. I'm quite capable of organizing my own life	1	2	3	4	5
38. I feel like my belongings are taking over my life	1	2	3	4	5

BACKGROUIND

The RAQ-A is an adaptation of the RAQ (West et al., 1987) by Nedelisky & Steele (2009). The original RAQ was designed to assess various features and patterns of attachment relationships, higher levels reflecting greater interpersonal attachment insecurity. The adapted version was designed to assess attachment to inanimate objects, rather than to an attachment figure.

The RAQ-A consists of 38 items, 17 items in 4 subscales assess inanimate object attachment security, 20 items in four subscales assess attachment patterns, and one item measures the use of the attachment relationship to inanimate objects.

The RAQ-A is reported to have good internal consistency (alpha = .89) and all the subscales (apart from Self Reliance, alpha = 0.39) have adequate to good reliability (alpha = 0.73-0.85).

SCORING

Inanimate Object Attachment Security Subscales

Feared Loss	**Proximity Seeking**	**Secure bases**	**Separation protest**
1	2	3	4*
10	11	12	13*
17	18	19	20
23	24	25	26
29			
score =	score =	score =	score =
Total score =			

Attachment patterns

Angry withdrawal	**Compulsive care-giving**	**Compulsive care-seeking**	**Compulsive self-reliance**
5	6	7	8
	14	15	16*
	21	22	
	27*	28	
	30*	31*	
	32	33	
	34*	35	
	36	37*	
		38	
score =	score =	Score =	score =

Use of attachment relationship is the score to item 9 = _____

Note: items with * are to be reverse-scored.