# The Recall of Dementia-Related and Neutral Words by People with Dementia: The Ironic Process of Thought Suppression

Richard Cheston[a]*, Emily Dodd[a], India Hart[b] and Gary Christopher[a].

[a] *University of the West of England, Bristol, UK*

[b] *RICE Memory Clinic, Royal United Hospital, Bath*

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*Correspondence to: Richard Cheston, Department of Health and Social Sciences, University of the West of England, Frenchay Campus, Coldharbour Lane, Bristol, BS16 1QY, England, UK; Email: Richard.Cheston@uwe.ac.uk.

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## Abstract

**Objective.** Thought suppression may not work effectively when people have a cognitive impairment. This study tests whether participants with dementia showed lessened or enhanced recall and recognition of dementia-related words compared to a control population.

**Methods.** Fifty participants living with dementia with mild levels of cognitive impairment and a control group of fifty-two participants without a diagnosis of dementia took part. A list of 12 words, composed of six dementia-related and six neutral words matched for frequency and length, was read out on four occasions, with the word order being varied for each presentation. Recognition was also assessed.

**Results.** There was an interaction between word-type and participant group at both recall and recognition. While control participants recalled more neutral than dementia related words, there was no difference for dementia participants. However, dementia participants recognised a significantly higher proportion of the dementia-related words while there was no difference in word type recognition for control participants.

**Conclusions.** This study adapts a social psychological paradigm to explore whether an important psychological mechanism for reducing distress can be affected by cognitive impairment. Our findings suggest that for people living with dementia, thought suppression may be either ineffective in reducing conscious awareness of distal threats or operate in an ironic fashion. While threatening proximal material may be repressed from awareness, distal threats may return into implicit awareness. This casts new light on research and has clinical implications.


**Keywords**: dementia, Alzheimer's disease, self concept, memory, awareness, threat

**Key points.**

- Thought suppression is an important psychological mechanism that limits awareness of threatening material and reduces anxiety. However, in studies where the cognitive load on participants is increased, then attempts to suppress thoughts can ironically act to increase unconscious awareness of those very thoughts that the person is motivated to avoid.
- We tested whether the cognitive impairments of people with dementia have the ironic effect of increasing the recall of words related to dementia. Participants with and without dementia were asked to remember a list of dementia-related and neutral words.
- The results suggest that for people with dementia, thought suppression may act in an ironic fashion to increase implicit awareness of dementia. This might account for the implicit awareness of dementia even when people lack explicit awareness - the phenomena that psychoanalysts have describe as the return of the repressed.

## Background

People who are living with dementia encounter reminders of their illness on a daily basis. Given the wealth of research evidence suggesting that dementia presents a threat to different facets of the self including personhood [1, 2, 3] and self-esteem [4, 5, 6], for many people who are living with dementia, encountering reminders of their dementia may be distressing. Consequently, it is important to understand the ways in which those cognitive processes that act to protect the self from psychological threat and thus to reduce distress operate for people with dementia. Specifically, it may be the case that those changes in cognitive functioning that occur as a result of the dementia may impede the operation of these mechanisms.

There are two ways in which people living with dementia may be reminded of their illness: these may be directly aimed at the person, as is the case when a doctor discloses their diagnosis to them; or reminders may be indirectly encountered, as when the person walks past an advert about a dementia charity. In the former case, the threat to the person's identity is proximal: it is brought to the person's conscious attention and directed at the self. In the latter case, the threat is distal: it is implicit and not directed at the self. Here, although the information may be processed to some degree, the person will nevertheless not be consciously aware of it.

Importantly, social psychological research indicates that two, separate processes may be at work to determine recall of proximal and distal threats. In the case of proximal threat, the focus of our previous papers, people with mild levels of cognitive impairment caused by dementia have poorer recall for highly-threatening dementia-related information when it referred to themselves as opposed to being directed at another person [7] - a well-established phenomenon within social psychology known as the Mnemic Neglect Effect or MNE [8, 9, 10]. This selective

forgetting of highly-threatening, self-referent information about dementia seems to operate in the same way for people with mild levels of cognitive impairment as it does for people without dementia: for both groups the MNE acts to protect the self from threat.

In the case of distal threats, however, a separate process, namely thought suppression, seems to act to protect the self and to reduce the distress that would otherwise arise [11, 12, 13]. It is this second process that will be our focus in this paper. Thought suppression involves two cognitive systems acting in tandem: in order to avoid thinking about a distressing or threatening subject, we must first scan the environment to identify potential triggers or reminders of that threat, before then directing our attention away from that threatening material so that it cannot then enter conscious awareness. Thus while one part of the cognitive system monitors for threats, a second part directs or operates a control process [14]. Generally, this dual process operates successfully to reduce conscious awareness of threatening material. However, this process can, under some circumstances, break down with the consequence that attempts at thought control do not merely become ineffective, but can instead have the opposite effect of increasing awareness of the to-be-suppressed material [14, 15]. The crucial factor that seems to determine whether thought suppression is successful or, ironically, has the opposite effect, appears to be the availability of sufficient mental capacity to enable both cognitive systems to operate in tandem. Cognitive overload, then, precipitates thought suppression operating in an ironic way to increase awareness.

For people without dementia, cognitive overload may occur in everyday life as a result of stress, worry or trauma. Within the laboratory this can be simulated by researchers manipulating the cognitive load that they place on healthy, cognitively

intact participants, for instance by requiring participants to complete multiple tasks concurrently, adding in time pressures or by using a variety of affective and stress-related preoccupations [16, 17]. The impact that these experimental manipulations have is that while potential threats continue to be detected, there is insufficient spare cognitive capacity to divert attention away from them. Consequently, with the operating process being undermined, the impact of the monitoring process is enhanced [11, 14, 15], resulting, ironically, in the increased awareness of this material.

What is not clear, however, is whether for people living with dementia who encounter distal threats such as reminders of their dementia thought suppression acts in the same way that healthy adults do, or through an ironic, opposite effect. Dementia by definition reduces the cognitive capacity available to a person, whether this is due to a deficit of attention in people with Alzheimer's Disease [18], Lewy-body [19] and vascular dementia [20], or deficits in verbal memory [21, 22] and executive functioning [23]. It is possible, therefore, that this reduced cognitive capacity might make it more likely that thought suppression would act in an ironic fashion for people with dementia even in the absence of any other demands on their cognitive functioning. This is precisely this possibility that we test for in this study.

**Aims.**

We recruited two groups of participants: people with mild levels of dementia and people without dementia. Participants first recalled a word list comprising six pairs of matched words that were either dementia-related or neutral. They were then asked to recognise which words, from a list of 24, they had originally heard. We hypothesised that if participants who have dementia are motivated to avoid reminders of their condition, then given their reduced cognitive capacity, thought suppression may operate in an ironic manner, with the operating process being less effective at

suppression, whilst the monitoring system continues to scan for and detect dementia-related material. This imbalance between the two systems would have the paradoxical effect of creating heightened awareness of such material, resulting in better recall and recognition of dementia-related words relative to control participants. Alternatively, if thought suppression is not affected by reduced cognitive capacity, then we reasoned that the operating process of participants who are living with dementia will ensure that dementia related words will be less well attended to than the neutral words and thus less well recalled or recognised. Finally, if participants are not motivated to avoid reminders of their memory loss, then there will be no difference in recall for the two types of words between dementia and control participants.

## Method[a]

**Generating study materials.** We created a list of six word-pairs, consisting of dementia-related words (concentrate, confused, forget, memory, mental, stupid) and neutral words (effective, holiday, largest, remarks, seeing, written). We matched word pairs for frequency of use[b] and word length (number of syllables). With the exception of concentrate (verb) and effective (adjective), all word pairs were also the same parts of speech. A total of 127 participants (99 undergraduate students at University of the West of England, taking part for course credit, and 28 members of staff or friends and family) rated these 12 words using an online Qualtrics survey (www.qualtrics.com)[c]. For each word, participants made two ratings from 1 (*not at all*) to 9 (*extremely*): how diagnostic/characteristic of dementia the word was, and the extent to which the word reflected serious consequences for well-being. As responses to the two questions were positively correlated (Table 1), we aggregated them into an index. A series of paired-

[a] The trial protocol was registered on-line (Current Controlled Trials ISRCTN30485698)
[b] Obtained from the British National Corpus http://ucrel.lancs.ac.uk/bncfreq/lists/1_2_all_freq.txt
[c] The on-line survey received approval from the University or the West of England Faculty of Health and Social Sciences ethics committee on the 16th November, 2016 (HAS.16.11.043)

samples t-test indicated that, for each word pair, the index of the dementia-related word was significantly higher than that of the neutral word ($p < 0.001$): for each pair the dementia word was both significantly more characteristic of dementia and more threatening to well-being.

**Recruitment of participants with dementia[d].** Between February and October 2015, we recruited 50 participants with dementia from a single memory clinic in southern England. Participants were eligible to take part if a diagnosis of probable Vascular Dementia [(24)], Alzheimer's disease [(25)], or mixed dementia had been made within the previous 18 months. All participants had been independently assessed as having mild levels of cognitive impairment and as having the capacity to consent to take part in research. People who had either a significant history of pre-morbid psychiatric problems or who had significant depression or anxiety were not eligible for participation (Table 2, Figure 1).

**Recruitment of control participants.** Between January and July 2016, we recruited 56 participants (either undergraduate students, family and friends or healthy volunteers enrolled on the Join Dementia Research register[e]). Participants were eligible if they did not have dementia or another condition affecting their cognitive capacity and if they did not have significant levels of depression or anxiety (Table 2, Figure 2).

**Measures.** Anxiety and depression may influence memory for emotionally-charged words [(26, 27)]. Hence, we measured anxiety with the Geriatric Anxiety Inventory or GAI [(28)] and depression/dysphoria with the 15-item version of the

[d] The trial was granted NHS Research Ethics Committee approval on the 18th of December 2014 (14/SW/1142), with two major amendments approved subsequently (15th of April 2015 for home visits and 13th of November 2015 for recruitment of control participants). The study received approval from the University of the West of England Faculty of Health and Social Sciences ethics committee on the 13th of February, 2015 (HAS.15.02.113)

[e] JDR; https://www.joindementiaresearch.nihr.ac.uk

Geriatric Depression Scale or GDS [29]. While levels of cognitive functioning for participants in the dementia arm had been assessed prior to referral to the study, we assessed the cognitive ability of control participants with the Montreal Cognitive Assessment or MoCA at study initiation [30].

**Stimuli and procedure.** The order of the 12 words was randomised across four trials, with participants completing the task individually either on university premises (control participants only), their own homes, or at a memory clinic. A Research Assistant read out the word lists (Appendix 1), with recall assessed at the end of each of the four trials. Participants then completed a recognition task, which consisted of 24 items, half of which were the original list items and half novel ones (Appendix 2). We again matched the novel words against the original ones for length, frequency, and type.

We screened participants with dementia for anxiety and depression before data collection on the basis of their clinical records. However, we were unable to screen control participants prior to entering the study. Instead, we collected the GAI and GDS after taking consent, but before reading the word lists. We subsequently excluded three healthy volunteers from analysis as their GAI or GDS scores were more than three standard deviations above the mean, and also in excess of the clinical cut-off scores for extreme levels of anxiety or depression (i.e. GAI scores of 15 or over out of 20, and GDS scores of 12 or more out of 15). We removed data from a fourth healthy volunteer, because their score on the MoCA (23 out of 30) indicated a potential cognitive impairment. Consequently, we analysed data from 52 of the 56 healthy volunteers, and from all 50 of the dementia participants (although one dementia participant did not complete the recognition task).

**Between-group differences** (Table 1). Unsurprisingly, control participants scored significantly higher on the MoCA cognitive screening test, $t(78) = 23.32$, $p < 0.001$. Additionally, participants with dementia (vs. control participants) had higher levels of depression, $t(100) = 3.10$, $p < 0.003$, but lower levels of anxiety, $t(78.87) = -2.98$, $p < 0.004$. Also, participants with dementia (vs. control) were older, $t(78.98) = 12.83$, $p < 0.001$, and were more likely to be female than male, $\chi^2 = 5.83$, $p < 0.016$.

## Results

**Recall.** We combined the number of words recalled across all four trials to form two variables reflecting the total recall of dementia-related words and neutral words. We then entered these data into a 2 (group: dementia, control) x 2 (word type: dementia, neutral) Analysis of Co-Variance (ANCOVA), with levels of anxiety and depression being controlled for. If dementia participants showed a processing bias for dementia-related words, then we would expect to find an interaction between group and word type.

Overall, there was a significant main effect of group, with dementia participants recalling fewer words in total ($M = 16.04$, $SD = 3.82$) than control participants ($M = 26.81$, $SD = 4.43$), $F(1, 100) = 172.43$, $p < 0.001$, an unsurprising finding consistent with the memory deficit inherent in dementia [31, 32]. The word type main effect was not significant, $F(1, 100) = 0.84$, $p = 0.361$. There was, however, an interaction between group and word type, $F(1, 100) = 4.281$, $p < 0.041$, which remained significant after covarying anxiety, $F(1, 99) = 6.456$, $p < 0.013$, and depression, $F(1, 99) = 4.521$, $p < 0.036$. Pairwise comparisons indicated that control participants remembered significantly more neutral words than dementia-related words, ($t(51) = 2.02$, $p < 0.049$). However, there was no difference in the recall of

dementia-related and neutral words in those participants with dementia ($t(49) = 0.86$, $p = 0.394$) (see Table 3).

**Recognition.** Following previous work [33], we used Signal Detection Theory to analyse the recognition data. In particular, we calculated a discrimination index for both dementia and neutral words ($d^1$) by subtracting the ratio of false positives (or False Alarms) from the ratio of correct positive responses (or Hits). We then entered the discrimination index into a two-way mixed ANCOVA, with group (dementia vs. control) as a between-subjects factor and word type (dementia vs. neutral) as a within-subjects factor, and depression and anxiety as covariates. As with the recall data, we hypothesised that there would be a significant interaction between group and word type.

Once again, unsurprisingly, there was a main effect for participant groups ($F(1, 98) = 306.75$, $p < 0.001$), with dementia participants ($M = 0.48$, $SD = 0.39$) recognizing fewer words overall than did control participants ($M = 0.92$, $SD = 0.40$). There was also a main effect for word type ($F(1, 98) = 9.86$, $p < 0.002$) with participants recognizing more dementia-related ($M = 0.74$, $SD = 0.36$) than neutral ($M = 0.66$, $SD = 0.56$) words. The interaction between group and word type was also significant, as predicted, $F(1, 98) = 6.89$, $p < 0.010$, and remained so after controlling for anxiety, $F(1, 97) = 5.30$, $p < 0.023$, and depression, $F(1, 97) = 6.40$, $p < 0.013$. Pairwise comparisons indicated that dementia participants recognised significantly more dementia-related words than neutral words ($t(48) = 4.46$, $p < 0.001$). However, there was no difference in recognition scores across the two conditions for control participants ($t[50] = 0.34$, $p = 0.735$).

## Discussion

This study set out to explore whether the cognitive impairments associated with dementia affect the ability of people who are living with dementia to suppress thoughts about their illness. We did this by creating two lists of six words: one composed of dementia-related words and the second of neutral words. The words in each list were matched for their length and frequency of use and a survey confirmed that each of the dementia words was both more characteristic of dementia and more of a threat to well-being than their matched, neutral equivalent.

For both recall and recognition tasks there was an interaction between word type and participant groups. For the recognition task, the ironic impact of thought suppression is clear: there was an interaction between word type and participant group, with participants with dementia recognising significantly more dementia words than neutral words. For recall, however, the picture is less clear: there was again an interaction between word type and participant group, but while control participants had better recall for neutral than for dementia words, for participants with dementia there was no difference in recall between the two types of words.

Our findings are therefore broadly consistent with the hypothesis that the cognitive impairment of people living with dementia affects their ability to use thought suppression. In the case of recognition, thought suppression seems to act in an ironic way in that it improves, not reduces, the recognition of dementia words; for recall, thought suppression eliminates the preference for neutral words shown by the control group. For both sets of results, the interactions between participant groups and word types points towards thought suppression operating in a significantly different way for people who are living with dementia and those without dementia.

These findings are also consistent with research elsewhere. As thought suppression involves the operation of a dual process (both monitoring and operating

systems), this increases the time taken to process this material [34]. Using an emotional Stroop task, Martyr *et al.* [35] found that both people with early dementia and their carers took longer to respond to the colour of dementia-related words than they did to neutral words matched for word frequency and syllable length. The authors argued that the salience of the dementia-related words captured the attention of both participants with dementia and carers, and thus led to increased processing time before the appropriate response was made.

*Strengths and limitations*. The methodological approach used in this study had a number of clear strengths. For instance, unlike the Martyr *et al* study, we verified that the dementia words they we used were both more characteristic of dementia than were the neutral words and that they represented an increased level of threat to well-being. Similarly, by comparing the performance of people with and without dementia, we were able to take into account any inherent differences in memorability between neutral and dementia words. This seems to be the most likely reason for the significant difference in recall between the two words types for the control group - a difference that disappears at recognition due to a clear ceiling effect (with index scores of 0.92 for neutral and 0.91 for dementia words).

At the same time, the study has a number of limitations. First, the two arms of the studies differed significantly: the dementia arm of the study contained proportionately more men than women compared to the control arm, and the average age of participants in the dementia arm was older. Additionally, participants with dementia tended to be less anxious and more depressed. As both age and anxiety affet recall, it is therefore plausible that either or both of these factors this might have affected recall..

Arguably, an additional limitation is the absence of a measure of explicit awareness. While awareness is a complex (and to some extent contentious) issue in dementia research, there is a general consensus that it is a product of an interaction between neurological, psychological and social factors [36]. While the nature of these psychological processes is somewhat opaque, elsewhere we have argued that explicit awareness may be affected by the level of threat posed by self-referent information [7] and also by levels of psychological resources available to individuals [37]. Additionally, some measures of awareness are themselves limited, either because they reduce a very complex process to a dichotomy (aware/not aware) or because they focus on cognitive processes and neglect other, related issues including identity and affect [38, 39]. Although some more recent measures such as the RADIX [40] take a more nuanced approach, these do not provide simple outcomes, which could be easily incorporated our statistical analysis. Finally, a measure of explicit awareness would have been of only limited use, as the focus of this study has been on the implicit awareness of distal threats.

*Ethical issues*. Carrying out research into awareness with people living with dementia risks causing participants distress if they are required to confront threatening or emotional issues without being adequately prepared or supported. In our submission for ethical review, we therefore included a protocol for managing distress and at the end of the research process ensured that once participants were fully debriefed they were offered a mood repair (watching a comedy sketch).

*Proximal and distal defences.* Active mental control appears to be fundamental to much of our daily lives [11, 12, 13] - we are adept at reflecting on our mental activities and controlling our thoughts and emotions. This mental control enables us to manage the anxiety that would otherwise arise from encounters with

either proximal or distal threats. Elsewhere research points to people living with dementia having a relatively unimpaired ability to selectively forget highly threatening, self-referent information about dementia (the Mnemic Neglect Effect or MNE) and thus to reduce the anxiety that would arise from conscious awareness of proximal threats to self [7]. The focus in this study, in contrast, was on dementia as a distal threat: although the dementia words were rated as representing more of a threat to well-being than were the neutral words, this threat was neither explicitly related to dementia (for instance, we did not include words such as "Alzheimer's") nor was it self-referent.

Taken together, these research studies suggest that for people living with dementia, the reduction of cognitive capacity associated with dementia impacts on those psychological defences that protect against threats to self in a complex manner. When dementia poses an explicit and self-referent threat, then the MNE acts to reduce recall. This is, perhaps, analogous to the psychoanalytic defence of repression in which threatening material is warded off and pushed out of conscious awareness [41]. However, when distal, or indirect reminders of dementia are encountered, then thought suppression is at best ineffective, and at worst acts in an ironic manner to increase implicit awareness. This, too, is consistent with psychoanalytic theory, which alerts us to the way in which material that has been repressed may return, sometimes in a disguised format, a phenomena known as the return of the repressed [42]. Research elsewhere also suggests the occurrence of both repression and the return of this repressed material for people who are living with dementia: thus experimental research suggests the occurrence of implicit awareness of dementia in the absence of explicit awareness [43, 44], while qualitative research points to the presence of

otherwise repressed material returning in disguised form through metaphors and story-telling [39, 45].

In conclusion, this study suggests that thought suppression may operate in a different way for people affected by dementia as for the general population. It is possible that even the relatively mild cognitive impairments found in our participants resulted in the operating system directing attention becoming less effective. Consequently, the monitoring system, which identifies threat, and which usually functions just to activate the operating process, instead starts to supersede it ensuring that this material is actually better processed, and thus better recalled. Attempts to suppress unwanted thoughts about dementia may thus be rendered either ineffective or indeed may operate in an ironic fashion to increase implicit awareness of dementia.

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**Conflict of interest**. None

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**Table 1: validity of word pairs (N = 127)**

| Frequency per million words* | Dementia related word: index mean (SD) and correlation between typicality and threat | Control word: index mean (SD) and correlation between typicality and threat | Paired samples T-test |
|---|---|---|---|
| 76 | Memory<br>7.76 (1.39), *r* = 0.411** | Holiday<br>1.62 (1.04), *r* = 0.615** | *t*(126) = 40.43** |
| 62 | Forget<br>7.45 (1.39), *r* = 0.374** | Seeing<br>3.34 (1.79), *r* = 0.549** | *t*(126) = 22.37** |
| 58 | Mental<br>6.10 (1.97), *r* = 0.570** | Largest<br>2.32 (1.34), *r* = 0.557** | *t*(126) = 19.28** |
| 33 | Stupid<br>3.84 (1.97), *r* = 0.442** | Written<br>2.93 (1.69), *r* = 0.727** | *t*(126) = 5.19** |
| 21 | Concentrate<br>5.35 (1.90), *r* = 0.568** | Effective<br>3.26 (1.84), *r* = 0.747** | *t*(126) = 12.33** |
| 19 | Confused<br>4.78 (1.06), *r* = 0.520** | Remarks<br>3.07 (1.57), *r* = 0.593** | *t*(126) = 9.80** |

* word pairs are matched for frequency (British National Corpus http://ucrel.lancs.ac.uk/bncfreq/lists/1_2_all_freq.txt) and word length (number of syllables). All word pairs are the same parts of speech, except for concentrate (verb) and effective (adjective).

** = significant at the p <0.001 (2 tailed)

**Table 2: descriptive data for participants in dementia and control arms**

| | **Dementia arm (n = 50) Mean (SD)** | **Control arm (n = 52) Mean (SD)** |
|---|---|---|
| **Male** | 24 | 13 |
| **Female** | 26 | 39 |
| **Age** | 81.08 (7.23) | 48.18 (18.26) |
| **Cognitive level (MoCA)** | 17.76 (2.71) | 28.10 (1.25) |
| **Anxiety (GAI)** | 1.16 (1.60) | 2.56 (2.97) |
| **Depression (GDS)** | 2.06 (1.46) | 1.21 (1.30) |

**Table 3: Mean scores for recall and recognition (standard deviations in parentheses)**

| | **Dementia participants (n=50)** | | **Control participants (n=52)** | |
|---|---|---|---|---|
| | **Dementia words** | **Neutral words** | **Dementia** | **Control** |
| Mean aggregate of trials 1 to 4 | 8.22 (2.29) | 7.82 (2.73) | 12.88 (2.52) | 13.92 (3.22) |
| Recognition ($d^1$ scores) | 0.55* (0.34) | 0.41* (0.47) | 0.92 (0.28) | 0.91 (0.53) |

* n = 49

**Figure 1: flow chart for dementia participants**

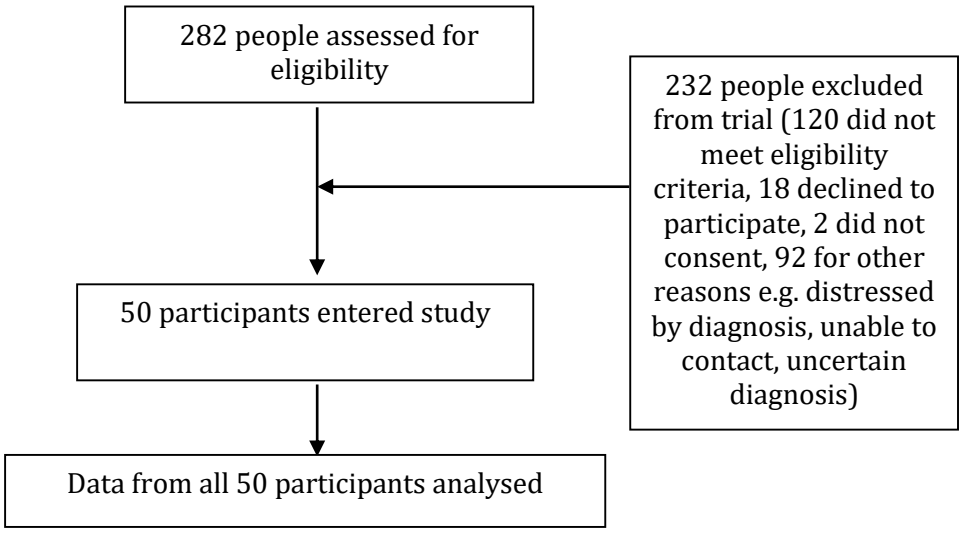

**Figure 2: Flow chart for healthy volunteer participants**