Apathy and activities of daily living in patients with early stage Alzheimer's disease

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Abstract

Over the past two decades, apathy has increasingly become more recognized as the most frequent and persistent neuropsychiatric symptom that patients often experience throughout all the stages of Alzheimer's disease (AD). However, little is still known about how apathy symptoms, particularly the sub-domains of apathy, may be associated with patients' daily functioning. This study investigated the relationship between the sub-domains of apathy and patients' functional status using the archival records of patients with early stage AD (N = 44) from the Albertina and Walter Sisulu Institute of Ageing in Africa (IAA) Memory Clinic at Groote Schuur Hospital. The findings showed significant correlations between cognitive apathy and both instrumental activities of daily living (IADLs) and basic activities of daily living (BADLS); behavioural apathy and both IADLs and BADLs; and no significant correlations between emotional apathy and either type of ADLs. When depression was included in the regression model with apathy, apathy was not predictive of functionality. However, after removing apathy-related items from the depression scale to reduce issues of collinearity, apathy was significantly predictive of functionality. While acknowledging the limitations of these findings due to a small sample size, practitioners and clinicians working with patients with AD can use these findings to develop behavioural and pharmacological interventions that are more relevant and effective to patients' condition.

Keywords: Alzheimer's disease; apathy; cognitive apathy; behavioural apathy; emotional apathy; activities of daily living; instrumental ADLs; basic ADLs; depression

Introduction

Alzheimer's disease (AD) is the most common neuro-degenerative disorder (Arlt, 2013; Schulman & Carpenter, 2008) and most frequent cause of dementia (Arlt, 2013; Guimaraes, Levy, Teixeira, Beato, & Caramelli, 2008; Iqbal, Sisodia, & Winblad, 2001). This progressive disorder is characterised by a decline in cognitive and functional impairments that are usually accompanied by behavioural deficits in almost 90% of patients with AD (Bozzola, Gorelick, & Freels, 1992). Several studies have shown that secondary to AD are behavioural and organic symptoms such as apathy, depression and inactivity, with apathy being the most common (Craig, Mirakhur, Hart, McIloy, & Passmore, 2005; Lyketsos et al., 2002; Onyike et al., 2007). Whereas extensive research has been done on the interrelations between the different behavioural manifestations of AD, for example, apathy and depression, and depression and functional impairment, the relationship between apathy and functional deficits remains understudied.

Contextualising the problem

Over the past two decades, apathy has increasingly become recognised as the most problematic neuropsychiatric symptom (Njomboro, Humphreys, & Deb, 2014; Moretti & Signori, 2016; Stanton, Leigh, Howard, Barker, & Brown, 2013). While this behavioural symptom has received a lot of attention from researchers in the past twenty years, little is still known about how apathy, particularly with an interest on its sub-domains, may be associated with patients' functional status (Chase, 2011). Most research on apathy has treated this condition predominantly as a unitary syndrome, despite available evidence that apathy is a multidimensional syndrome with different affective, behavioural and cognitive sub-domains (Levy & Czernecki, 2006; Marin, 1991; Njomboro & Deb, 2014; Robert et al., 2002).

Over the years, most studies on apathy have focused primarily on the relationship between apathy and depression (Levy et al., 1998; Starkstein, Fedoroff, Price, Leiguarda, & Robinson, 1993), apathy and executive functions involved in purposeful activity (Chase, 2011; Landes, Sperry, Strauss, & Geldmacher, 2001), and the prevalence of apathy in different neuropsychiatric disorders such as dementing illnesses (Pedersen, Larse, Alves, & Aarsland, 2009). For instance, previous research has indicated that apathy symptoms are more prevalent in patients suffering from dementia with Lewy bodies, frontotemporal dementia, Alzheimer's disease, major depressive disorders, stroke and Parkinson's disease (Clarke et al., 2011; Faerden et al., 2008; Starkstein, Jorge, Mizrahi, & Robinson, 2006).

Although the relationship between the sub-domains of apathy and activities of daily living in patients with dementing illnesses is still under-addressed, about 50% of dementia

sufferers develop apathy at some point of their illness (van Reekum, Stuss, & Ostrander, 2005). For example, the prevalence of apathy symptoms in patients suffering from Alzheimer's disease is approximately 60% (Clarke et al., 2011; McPherson, Fairbanks, Tiken, Cummings, & Back-Madruga, 2002; Stanton et al., 2013).

In general, apathy symptoms are associated with a worse illness prognosis and outcome (Clarke et al., 2011; Ishii, Weintraub, & Mervis, 2009), reduced cognitive abilities (Ishii et al., 2009; Landes, Sperry, & Strauss, 2005) and an elevated overall suffering for patients and their caregivers (Bower, McCullough, & Pille, 2002; Selten & van de Wiersma, 2000; van Reekum et al., 2005). Thus, given the high prevalence of apathy in patients with Alzheimer's disease (AD), understanding how apathy symptoms, particularly, how each specific sub-domain of apathy may be associated with patients' functional status is crucial towards developing behavioural and pharmacological treatment interventions that are more relevant and effective to the condition of patients.

Neuroanatomical bases of apathy in AD

While apathy is one of the most common neuropsychiatric symptoms (NPS) to develop at some point of AD, it is also the most frequent and persistent NPS that patients often experience all the way through the stages of AD (Craig et al., 2005; Lyketsos et al., 2002; Lyketsos et al., 2011; Onyike et al., 2007). For example, research on AD using the Neuropsychiatric Inventory (NPI) apathy subscale has reported a one month apathy prevalence of 72% among 50 outpatients with mild to severe AD (Mega, Cummings, Fiorello, & Gornbein,, 1996). Another report by the Kungsholmen population-based project showed apathy as the most common NPS in AD and that it may be a predictor of illness progression (Palmer et al., 2007).

Apathy was traditionally conceptualised as a symptom of depression (Cochrane et al., 2015; Leentjens et al., 2008; Sagen et al., 2010). The confusion between these two conditions arose from their shared symptomatology and overlapping content such as loss of interest and declines in functional status (Kirsch-Darrow, Marsiske, Okun, Bauer, & Bowers, 2011; Starkstein, Ingram, Garau, & Mizrahi, 2005). However, recent literature has shown that apathy and depression are clinically different symptoms with different neural underpinnings (Njomboro & Deb, 2012; Starkstein et al., 2005). In its definition, apathy is explained as a lack of motivation that is not explained by emotional distress (Marin, 1990). Depression on the other hand is characterised by emotional disturbances and a dysphoric mood (Kirsch–Darrow et al., 2011). In other words, while depression is a disorder of low moods, apathy is a syndrome of lack of motivation. Hence, negative moods such as disappointment, guilt,

failure, are observed in depression while apathy involves a blunted affect and no mood (Brown & Pluck, 2000). Regardless of these distinctions, the fact that at least three (fatigue, slowed movement, loss of interest in daily routine) of the nine criteria of major depressive disorder still reflect motivation (American Psychiatric Association, 2013), the confusion between these two disorders still prevails amongst clinicians. Thus, it is essential to be cautious when investigating apathy as it tends to be comorbid with depression and the two can easily get confused.

The term 'apathy' was first used by the Greek Stoic philosophers to refer to a freedom from emoting (Starkstein, Petracca, Chemerinski, & Kremer, 2001). The term was later used by Marin (1990) to conceptually describe a lack of motivation that is not explained by emotional distress, cognitive impairment or reduced levels of consciousness. To date, apathy remains conceptualized as a condition that is primarily characterised by a significant loss of motivation (Lanctot et al., n.d.).

Apathy manifests in three different ways; behaviourally, cognitively and affectively (Levy & Czernecki, 2006; Marin, 1991; Njomboro & Deb, 2014; Robert et al., 2002). For a long time, this tri-dimensional nature of apathy made it difficult for researchers to reach a consensus on the operationalization of the term and subsequently heightened the inconsistencies in how the term was used in the literature (Lanctot et al., n.d.). As an attempt to develop a working definition of apathy that could promote the chances of measuring this syndrome in a more valid and systematic manner, Marin (1990) further developed a model that defined apathy using its three sub-domains (outlined above). This model operationalised apathy as a composite of simultaneous reductions in goal-directed cognitive activity, purposeful overt behaviour, and emotional response (Marin, 1990). The Apathy Evaluation Scale (Marin, Biedrzycki, & Firinciogullari, 1991) was created based on the same model. To date in clinical practice, apathy is conceptualized as a lack of feeling, motivation and interest in relation to an individual's previous level of functioning that is manifested through reduced goal-directed behaviours in the cognitive, overt behaviour and affective aspects simultaneously (Bhat & Rockwood, 2011).

Marin's (1990) model was in accordance with the neuro-biological models which used specific underlying lesions to define three subtypes of disrupted processing; cognitive, auto-activation and emotional-affective (Cummings, 1993; Levy & Dubois, 2006). Neuro-imaging research has also indicated that apathy in AD is associated with atrophy and dysfunction of medial and inferior frontal regions that mediate motivation, behavioural initiation and reward mechanisms (Lanctot et al., n.d.; Stanton et al., 2013). For example,

structural neuro-imaging MRI studies have shown that apathy in AD is associated with smaller volumes of the orbitofrontal cortex, basal ganglia, anterior cingulate gyrus and other areas of the frontal cortex (Lanctot et al., n.d.; Stanton et al., 2013). These studies also showed that apathy in AD is associated with the presence of white matter lesions and/or hyper-intensities in the volume of the frontal white matter (Starkstein et al., 2009).

Functional neuro-imaging PET studies have shown a reduction in perfusion or metabolism in the orbitofrontal cortex or anterior cingulate gyrus in patients with apathy in AD (Marshall et al., 2007). Further results from ligand neuro-imaging studies of AD neuro-receptor sites have indicated that apathy in AD is associated with lower cholinergic receptor binding in the left frontal cortex, which is associated with emotional withdrawal, blunted affect, motor slowing (Sultzer et al., 2017) and a lower dopamine transporter binding in the bilateral putamen, which in turn is associated with poor initiative (David et al., 2008).

These findings collectively suggest that alterations or atrophy in the medial frontal regions of the brain (orbitofrontal cortex, anterior cingulate or other frontal circuit areas such as the frontal white matter, basal ganglia, dorso-lateral frontal cortex) can result in a reduced metabolism in these regions, which would in turn result in lower frontal cholinergic binding and lower dopamine input into these areas, subsequently causing apathy in AD (Lanctot et al., n.d.). More specifically, lower cholinergic receptor binding causes the emotional and behavioural symptoms of apathy, while lower dopamine levels cause the cognitive symptoms of apathy.

Neuroanatomical bases of apathy sub-domains in AD

On one hand, emotional apathy refers to reductions in emotional responsiveness to both negative and positive events that is demonstrated by emotional blunting (Stanton et al., 2013). For example, approaching life with a reduced intensity and not getting excited when a good event occurs. On the other hand, behavioural apathy defines reduced efforts, initiative and perseverance (Stanton et al., 2013) such as failing to get things done during the day and putting little or no effort into everything and anything that one does. Cognitive apathy however, defines a lack of interest (Stanton et al., 2013) that is manifested through behaviours such as being less concerned about one's problems than they are expected and not showing interest in having new experiences.

While the psychopathology of each sub-domain of apathy remains poorly understood (Stanton et al., 2013), some researchers have resorted to using anatomical correlates of emotional processing and volitional behaviour indicating the distinct brain areas involved in both these processes in healthy individuals to draw clues about the possible anatomical bases

involved in behavioural and emotional symptoms of apathy (Lau, Rogers, Ramnani, & Passingham, 2004; Murphy, Nimmo-Smith, & Lawrence, 2003). For example, functional imaging studies of self-initiated behaviour have consistently showed activations of the fronto-parietal circuit which involves the medial frontal gyrus, lateral prefrontal cortex areas and supplementary motor areas (Lau et al., 2004; Passingham, Bengtsson, & Lau, 2010). In addition, these studies have shown that emotional experience, expression and perception of healthy individuals is associated with activations of a network involving the basal ganglia, cerebellar, limbic and cortical regions, depending on the type of emotion that is being processed (Passingham et al., 2010; Fusar-Poli et al., 2009). These results are in accordance with those from neuro-imaging studies discussed earlier.

Moreover, in their experiment to test the hypothesis that emotional blunting and reduced behavioural initiative symptoms of apathy are associated with different neuroanatomical bases, Stanton et al. (2013) yielded results consistent with the findings from imaging studies in normal brain-behaviour associations discussed above. Their results indicated that emotional blunting was specifically associated with a reduced grey matter volume in the left insula while reduced behavioural initiative was associated particularly with a decreased grey matter volume in the medial frontal cortex (anterior cingulate and the ventrolateral orbitofrontal cortex). Although associations of apathy and atrophy of the insula cortex are by far, not commonly reported (Reijnders et al., 2010), the function of the insula in the processing of emotions (Murphy et al., 2003) and the reports on the activations of the insula in healthy individuals during willed behavioural tasks (Jenkins, Jahanshahi, Jueptner, Passingham, & Brooks, 2000), are consistent with findings from Stanton's study. These findings further corroborate the involvement of the insular cortex and the medial frontal regions in apathy symptoms.

Cognitive apathy reflects a disturbance in an individual's executive functioning which is vital in the successful completion of goal-directed behaviours (Aron, 2008). Symptoms showing a lack interest (cognitive apathy) have been associated with deficits in the lateral prefrontal cortex and the dorsal caudate nuclei (McPherson et al., 2002; Moretti & Signori, 2016). Sultzer et al. (2017) found that cognitive apathy was associated with lower metabolism in the bilateral anterior cingulate, bilateral medial thalamus and the left insula. Njomboro and Deb (2014) also found that cognitive apathy symptoms were associated with executive dysfunctions while emotional apathy was associated with dysfunctions in perceiving emotions.

Neuroanatomical bases of activities of daily living in AD

Although the specific role of apathy in activities of daily living (ADLs) is not yet known (Lechowski et al., 2009), a substantial number of studies suggest that apathy symptoms are associated with a disturbance in patients' activities of daily living or functioning (Bhat & Rockwood, 2011; Burns & Iliffe, 2009; Starkstein et al., 2001). These disturbances in behaviour are demonstrated by negative tendencies such as little concern with personal hygiene and maintaining a healthy diet (Ishii et al., 2009). For example, Lechowski et al. (2009) conducted a longitudinal cohort study to investigate the role of apathy in rapid loss of autonomy in IADLs in women suffering from AD. The results of their study indicated that 27.6% of the women experienced a decline in IADL within a year and that 22.1% of those women were apathetic (Lechowski et al., 2009). The findings of their study suggest that apathy is partially predictive of competence in IADLs.

ADLs are sub-merged into two categories: basic activities of daily living (BADLs) and instrumental activities of daily living (IADLs). The BADLs define the day to day self-care activities such as dressing, bathing, and eating or feeding oneself, whereas IADLs relate to daily routines that involve a much higher level of complexity and require an individual's ability to live independently in the society such as managing finances, doing housework, shopping and the ability to drive oneself (Mioshi et al., 2007). Cognitive declines consistently observed in AD are usually severe enough to result in an impairment of patients' everyday functional abilities (American Psychiatric Association, 2013). However, the relationship between cognitive processes and ADLs is still a controversial topic (Mioshi et al., 2007).

Difficulties in performing ADLs are progressive in AD and typically assume a hierarchical pattern involving IADLs to a larger extent than BADLs (Mioshi et al., 2007; Nadkarni, Levy-Cooperman, & Black, 2012). Hence, more research has been done on IADLs than on BADLs. To the best of our knowledge, no study has particularly explored the neural correlates of BADLs in AD up to date. The reasons for the limited BADLs research could partly be due to the observation that patients are usually still functional in BADLs to a greater extent even when in the moderate stages of AD (Mioshi, Hodges, & Hornberger, 2013). However, Mioshi et al. (2013) found that declines in the performance of BADLs in AD were associated with frontal atrophy.

In the early stages of AD, patients demonstrate difficulties in complex IADLs such as shopping, going for outings, cooking and managing finances. Eventually, a loss of basic self-care activities would manifest secondary to the declines in performing IADLs (Lehfeld & Erzigkeit, 2000). IADLs are multi-dimensional, and can thus be further classified into three

sub-components; initiative (the ability to initiate an activity), preparation (the ability to accurately plan for the pattern of succession involved) and performance (to effectively perform the order of events required for the successful completion of the task; Nadkarni et al., 2012). This sub-classification of IADLs allows for a more robust assessment of functional impairment at each step of performing an activity (Beck & Frank, 1997).

Several studies have indicated significant associations between cognitive and behavioural symptoms of AD and functional impairment due to dysfunctions in the prefrontal cortex (Boyle et al., 2003; Cahn-Weiner, Ready, & Malloy, 2003; Lechowski et al., 2003; Senanarong et al., 2005; Tekin et al., 2001). Functional declines in AD have also been associated with dysfunctions in the medial temporal, occipital, orbitofrontal and anterior cingulate areas (Marshall, Fairbanks, Tekin, Vinters, & Cummings, 2006). Mioshi et al. (2013) also found consistent results which showed that dysfunctions in the performance of ADLs were associated with widespread cortical (temporal, posterior cingulate, frontal, parietal) and sub-cortical (caudate) atrophy. Although no consistent correlations between cognitive processes and IADLs dysfunctions have been fully established (Mioshi et al., 2007), these findings suggest that a malfunction of heterogeneous cognitive processes could lead to IADLs dysfunction (Mioshi, et al., 2007; Mioshi et al., 2013).

Neuro-imaging studies have also found a prevalent involvement of the frontal pole, temporal-parietal cortices, medial-frontal, striatum, dorsolateral prefrontral cortex, anterior cingulate, precunei, hippocampi, occipital and angular gyri brain regions in the impairment of IADLs in AD (Cahn-Weiner et al., 2007; Nadkarni et al., 2012; Vidoni, Honea, & Burns, 2010). Nadkarni et al. (2012) carried out a study to investigate the cerebral perfusion correlates of the individual sub-components of IADLs in patients with AD. Their findings indicated that IADLs initiation was associated with multiple bilateral regions of the prefrontal, striatal and anterior cingulate and right basal ganglia perfusion. They also found that IADLs' planning was associated with right occipital perfusion while the performance of IADLs was associated with bilateral areas of the right parietal perfusion. The findings of these studies collectively show that dysfunctions in IADLs are mainly associated with micro-structural changes in the frontal superior cortex (Mioshi et al., 2013).

Apathy sub-domains, BADLs and IADLs

Based on the available literature on the anatomical bases of apathy and ADLs in AD discussed above, it can be concluded that both apathy and ADLs in AD are associated with atrophy of the fronto cortical and sub-cortical circuits. More specifically, both cognitive apathy and IADLs dysfunction are associated with frontal atrophy; both behavioural apathy

and IADLs dysfunction are associated with atrophy in the fronto-parietal circuit; while both behavioural apathy and BADLs dysfunctions are associated with frontal atrophy. These observations could explain the clinical observations of both apathy and functional impairment in patients with AD. Given the sizeable literature on the associations between global apathy and activities of daily living, and the common brain regions implicated in both apathy and functional status, we speculate that there might be specific and distinct associations between each sub-domain of apathy and the different categories of ADLs.

Research aim and question

The current study investigated the relationship between the sub-domains of apathy symptoms and activities of daily living in patients with AD. We examined how each sub-domain of apathy is associated with both BADLs and IADLs in patients with Alzheimer's disease. In addition, the study also looked how depression relates with ADLs as a way of controlling for the possible effects of depression (third variable effect). Given the neural pathways of both apathy sub-domains and BADLs and IADLs discussed above, we hypothesise that: (1) there is an association between apathy and ADLs; (2) cognitive apathy is predominantly associated with dysfunctions in the performance of IADLs, and (3) behavioural apathy is associated with dysfunctions in the performance of both IADLs and BADLs.

Methods

Design and setting

This study utilised a cross-sectional design to quantitatively investigate the relationship between apathy and activities of daily living, in patients with early stage AD.

The data for the study was collected from the archival records of patients with early stage AD from the Albertina and Walter Sisulu Institute of Ageing in Africa (IAA) Memory Clinic. IAA Memory Clinic was established in 1999 and is currently based at Groote Schuur Hospital (GSH) under the Department of Psychiatry and Mental Health (Kalula et al., 2010).

These records were not collected for the current study; data collection is an on-going process that is performed as part of the clinic's standard protocol. Usually, the patients who come to the Memory Clinic are referrals from other hospitals or general practitioners seeking clarity on their uncertainties regarding the patients' subjective memory problems. These patients are normally accompanied by a family member, friend or any significant other. All incoming patients at the clinic are required to complete an assessment procedure, which is completed in four stages.

The first stage is the intake or history taking stage whereby a registrar collects the demographic, biographical and medical information of all in-coming patients. S/he would also ask about the patients' current complaints that have brought them to seek medical or psychological help, as well as the patients' premorbid functioning. In the second stage (the separate collateral interviews stage), the patient goes through both physical and neurological assessments. While the patient is being examined, his/her significant other would complete a battery of questionnaires including the CSDD, the AES and the BADLS (all of which will be discussed in depth below) in a separate room.

The third stage is the medical and neuropsychological testing stage whereby the patient completes a battery of neurological tests for further examination. In the last stage, all health professionals, including the various doctors, a psychiatrist, a neurologist, a neuropsychologist and other practitioners in the Clinic would come together in a case conference where they would analyse the collected data and try to obtain a diagnostic consensus. Upon reaching a consensus on the diagnosis, the team of doctors would then discuss it further, along with the prognosis of the patient's condition, as well as the best-suited intervention route for the condition. When everything is finalised, the resident doctor would present the results to the patient and his/her significant other. All the information that is collected throughout the assessment procedure is then stored in the patient's file and sent to the IAA offices where it is stored in electronic databases.

Participants

The participant data for the proposed study was collected from the patient electronic databases at the GSH Department of Geriatrics' Memory Clinic. Previous research has shown that older adults often complain about subjective memory loss while showing disengagement from life and eventually becoming dependent on other people. Therefore, the proposed study used older patients' data to participate in the current study. This explains our target for the Geriatrics Memory Clinic patient population. We used G*Power 3.0 software (Faul, Erdfelder, Lang, & Buchner, 2007) to calculate the sample size for the proposed study and the results showed that a sample of 115 participants was suitable for our study. However, we ended up using only the data from 44 participants as most patient files did not have a diagnosis, while some files had some scales relevant to our study that were not filled in. There were no gender exclusions.

Inclusion Criteria

The participant data for the current study was extracted from data files of patients diagnosed with probable Alzheimer's disease. We drew each participant's diagnosis from

his/her patient file at GSH/IAA Memory Clinic. All the patients presenting with other forms of dementia were excluded from the present study because of its strict focus on patients with AD.

Measures

The Apathy Evaluation Scale (AES)

The Apathy Evaluation Scale (AES) is a reliable and well-validated measure of apathy (Marin, 1990). The AES comes in three versions or forms which are entirely determined by the individual completing it; the clinician (AES-C), the informant (AES-I) or the patient him/herself (AES-S). Previous research has shown that the AES-I version of the AES is the most sensitive detector of apathy as opposed to the other two versions (Clarke et al., 2011). This finding is expected because according to Marin and Wilkosz (2005), apathetic patients exhibit very little insight about their condition and are thus more likely to report inaccurate information about the apathy symptoms than would their caregivers (informants). In addition, the AES-I version is better than the AES-C in acquiring information about the patients' general overt behaviours in that, the informants interact on a daily basis with the patients unlike the clinician who observes the patient only for a limited time. Therefore, although the clinic has data pertaining to all the three versions of the AES scale, the current study will only use data from the AES-I version.

The AES-I (see Appendix A) is made up of 18 items which for example, include: "S/he is interested in things", "S/he approaches life with intensity", "S/he puts little effort into anything" (Marin, Biedrzycki, et al., 1991). All the items of the AES-I are measured on a four-point Likert-type scale (where 1 = not at all characteristic and 4 = a lot more characteristic) and the possible attainable total score range lies between 18 and 72, where a lower score indicates less apathy. A total score of 38 and above indicates the probability of the apathy syndrome. During scoring, items six, ten and eleven are recoded so that their scores could have a similar meaning as the rest of the variables.

Initially, the AES-I was validated as a valid and reliable tool using sample groups of patients suffering from stroke, major depressive disorder, AD and healthy adults (Marin, 1991). Recent research on the AES-I reports similar results showing that the scale has a good reliability with a Cronbach's alpha ranging from .86 to .94 and a test-retest reliability ranging from .76 to .94 (Clarke et al., 2011). The reports also show that the AES-I has a better convergent validity than both the AES-C and AES-S versions, $r = .5$, $p = .001$. Moreover, the AES-I has been validated as a valid and reliable instrument in both middle and low-income countries including China, Oman, Taiwan, Japan and Portugal (Clarke et al., 2011).

The Bristol Activities of Daily Living Scale (BADLS)

The BADLS (see Appendix A) is the most commonly used instrument in assessing the functionality of activities of daily living in patients with AD (Byrne, Wilson, Bucks, & Wilcock, 2000). It is one of the most widely used non-cognitive based assessment tools (focusing on everyday functionality on every patient's natural environment) in memory clinics (Lindesay, Marudkar, Diepen, & Wilcock, 2002). However, the proposed study will use the IAA Memory Clinic version of the BADLS, which is the modified version of the BADLS accustomed for use only at the IAA Memory Clinic during patients' assessment procedure.

The original BADLS has 20 items and was developed at the Bristol Memory Disorders Clinic with the aim of assessing the level of functionality in patients who were presenting with different forms of dementia (Bucks, Ashworth, Wilcock, & Siegfried, 1996). Like the AES-I version of the AES, the BADLS is completed by the informant, rather than the clinician or the patient himself for the same reasons outlined above.

The modified version of the BADLS has 17 items of the original 20. It is rated on a 5 point Likert-type scale and the possible total score ranges from 0 to 51. The scores lie in a continuum that shows the extent to which a patient relies on other people to perform their daily living activities; the higher the score the more the patient is dependent on the caregiver (Bucks & Haworth, 2002). For each item, there is an option of 'not applicable' which allows for an instance where some stimulus in the BADLS does not apply to an individual.

Psychometric research on the BADLS has shown that the scale has a high convergent validity and a good test-retest reliability with a Cohen's alpha of $r = .95$ (Bucks & Haworth, 2002). Although there is no current data on the psychometric properties of the BADLS in South Africa, the scale is widely used in South Africa as a screening instrument for probable dementia in patients in hospitals, clinics and clinical research (Bucks et al., 1996). Research has shown the BADLS to be a reliable and valid instrument for use in Asian, Australian and African countries (Bucks & Haworth, 2002).

Cornell scale for Depression in Dementia (CSDD)

The proposed study will use the CSDD (see Appendix A) to measure patients' levels of depression. The CSDD is a valid and reliable scale that was specifically designed to screen for and measure depression in patients with dementia (Korner et al., 2006; Leontjevas, Gerritsen, Vernooij-Dassen, Smalbrugge, & Koopmans, 2012).

The CSDD is a 19 item self-report instrument which measures a patient's behaviour, mood, physical, ideational and cyclic disturbances that s/he might have experienced in the

past weeks including the day of responding to the questionnaire (Alexopoulos, Abrams, Young, & Shamoian, 1988). The scale is measured on a 4 point Likert scale and the possible total score ranges from 0 to 38. High scores ranging from 18 and above, show the presence of a clear-cut major depression while scores ranging from 10 to 17 show a probable major depression.

Researchers working with patients suffering from dementia across different cultures have found the CSDD to have a high validity and inter-rater reliability (Korner, et al., 2006; De Bellis & Williams, 2008). The CSDD has been found to have an internal consistency coefficient of .84, with a Cronbach's alpha of .67 and a predictive validity of .75 (Amuk, Karadag, Oguzhanoglu, & Oguzhanoglu, 2003). Research has shown the CSDD as a moderate to excellent detector of depression in older patients as opposed to other scales of depression (Korner et al., 2006; Leontjevas et al., 2012). Although the CSDD has not yet been validated in South Africa, it has been found to be valid in other countries such as Austrlia, Japan and Turkey (Lin & Wang, 2008; Wongpakaran, Wongpakaran, & van Reekum, 2013).

Procedure

We utilised 44 patient files from the Memory Clinic records that met the eligibility criteria for this study. The data files were also adopted for use in the current study if the patient was seen at the memory clinic between 2012 and 2017. As a control measure, we collected all the hospital files of patients suffering from AD from the GSH Records Office in order to confirm the patients' diagnosis as per the electronic databases and screen for possible inconsistencies in the data.

Ethical Considerations

This study utilised archival data from an ongoing big project (Memory Clinic) and ethical approval attained for that bigger study was submitted to the Research Ethics Committee of the University of Cape Town, Department of Psychology to seek approval to conduct the current study, and it was approved. The study also observed the ethical guidelines for research with human subjects that are outlined by both the Health Professionals Council of South Africa and the University of Cape Town Codes for Research.

Statistical analysis

The data was retrieved from the archives at the memory clinic information storage unit and captured into SPSS version 24. To test whether there was a relationship between domains of apathy and ADLs correlation analysis was employed. Descriptive statistics were also computed to check whether the data was appropriate for running correlations.

Hierarchical regression analysis was also performed on SPSS to control for depression as it is often found to be comorbid with apathy in the target population. Hierarchical regression was chosen because of its ability to tell how much each predictor variable adds to the variance observed in the outcome variable. Therefore, we added both apathy and depression in the regression model to establish how much variance each one of these two conditions explained in predicting dysfunctions in ADLs.

All statistical analysis commenced with evaluation of descriptive statistics and other normality tests such as histograms and scatter-plots to ensure that all statistical assumptions were upheld. Descriptive statistics were also performed on the demographics of the sample.

Significance

The current study adds to the body of knowledge on the relationship between apathy, depression and ADLs amongst patients with AD. Previous studies have predicted that prevalence of dementia is yet to increase due to various factors. As such, a study such as this one proposed here, may contribute immensely to formation of interventions aimed at mediating the prevalence of such a disorder, especially if the hypothesis of this proposed study is not nullified.

Results

Sample characteristics

In total, 44 patient data files of which 31 (70.5%) were females and 13 (29.5%) were males, were employed as participant data in the current study. Eligible patients whose records were obtained at the time of data collection ranged between the ages of 53 to 92 years old. In addition, the majority of the patients whose data files participated in this study were Coloured (61.4% of the total sample): 20.5% were White; while only 9.1% (4 people) were African; and y 4 patients did not disclose their race. Moreover, 90.7% of the total sample had a matric as their highest level of education or below; the majority had attended formal school until grades 8-11 (46.5%), whereas only 3 people (7.0%) had attained a university degree and only 1 person did not disclose his/her level of education.

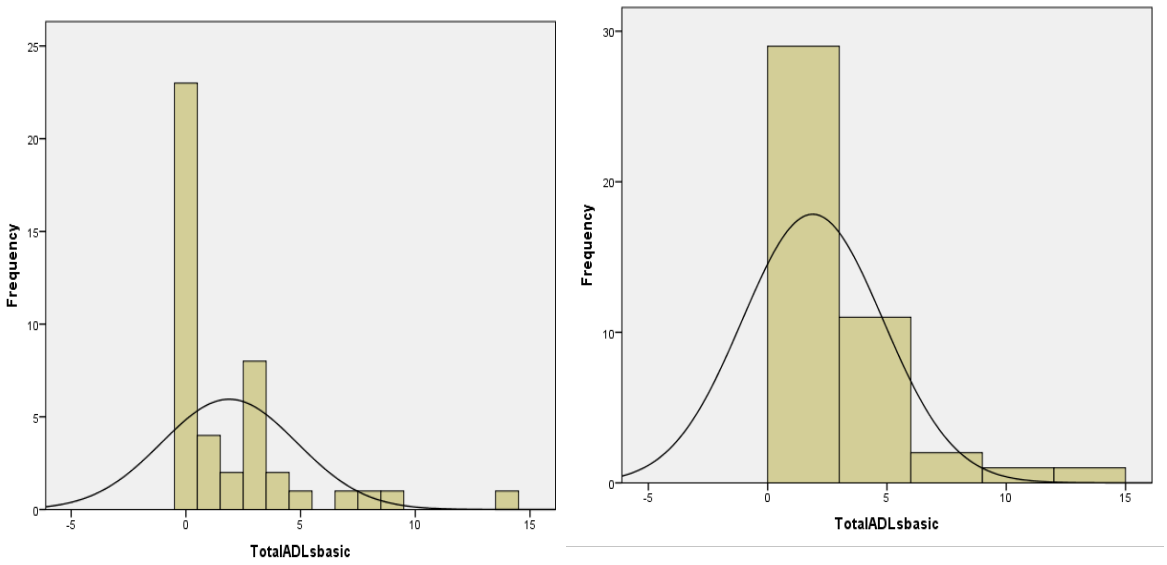

Figure 1. Basic activities of daily living frequency distribution (*N* = 44)

On the Bristol Activities of Daily Living Scale (modified), most participants scored zero on the Basic ADLs subscale. The possible scores ranged from zero to fourteen (*M* = 1.89, *SD* = 2.95). Thus, the distribution of data was skewed to the left.To try and balance the skews, the histogram was collapsed into fewer categories. The results for before and after the categories were collapsed are shown in Figure 1 above.

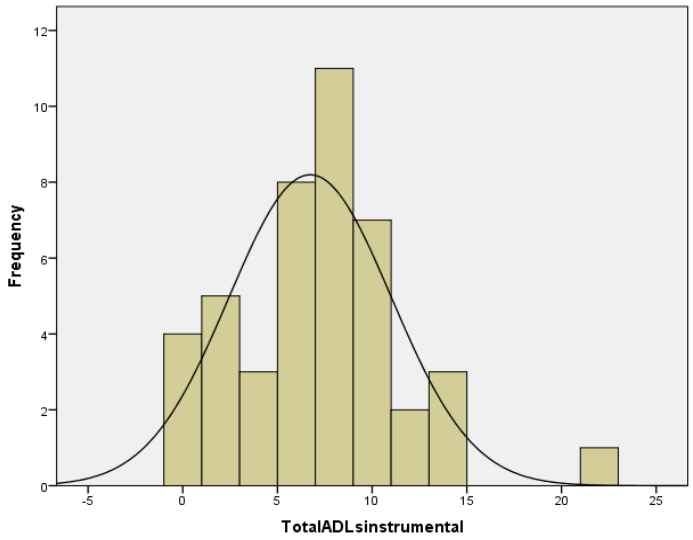

Figure 2. Frequency distribution of instrumental activities of daily living (*N* = 44)

The distribution of responses on the Instrumental ADLs was approximately normally distributed. Possible scores in this subscale ranged from 0 to 21, with a score of 0 indicating that the patient can still perform instrumental activities independently whereas a score of 21

meant that the patient was completely dependent on caregivers to help with Instrumental ADLs. This analysis utilised all the 44 participant data that were used in this study (M = 6.73, SD = 4.83) and the results are presented in Figure 2 above.

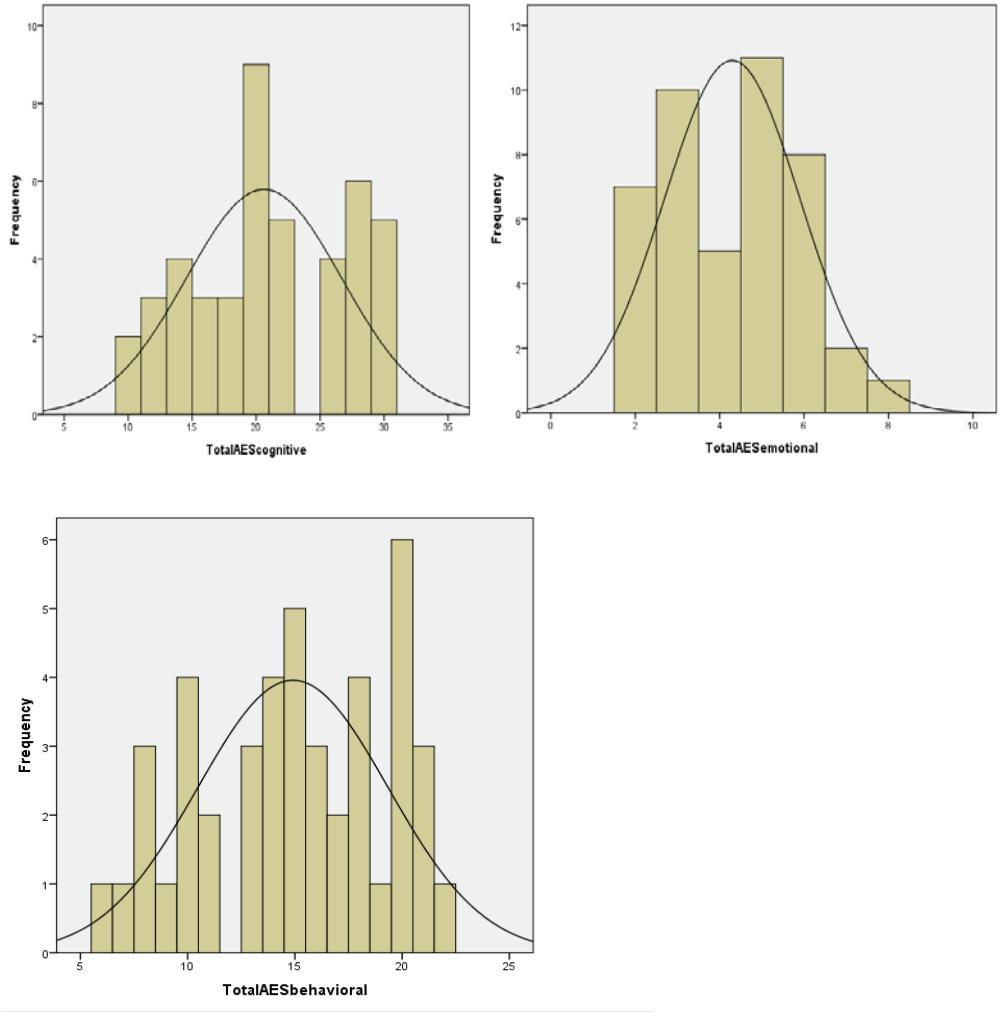

Figure 3. Distribution of scores on the Apathy sub-scales (N = 44)

The Apathy Evaluation Scale has 3 main sub-scales and across all the three, participants had a range of scores. Although the distribution was not clearly normal, it was not worrisome either, as the skews were very minimal. Such results can also be expected when working with real life situations and also taking into consideration the possible effects of a small sample on the distribution of the data and its negative effect power of the findings. The distribution of data for these sub-scales is presented in Figure 3 above.

Relationship between activities of daily living and apathy

To investigate the association between ADLs and apathy, correlation tests were performed for the types of activities and the sub-scales of apathy. The number of variables

across the types of ADLs were not equal, hence basic ADLs had a possible range of 0-14, while instrumental ADLs had a possible score range of 0-21. The items on the AES were also unbalanced across the three AES sub-scales: cognitive apathy was made up of 8 variables; behavioural apathy had 5 items; while emotional apathy had 2 items.

Table 1. Correlations between ADL types and Apathy sub-scales

Spearman's rho	Variable	1	2	3	4	5
	1.TotalADLbasic					
	2.TotalADLinstrumental	.459**				
	3.TotalAEScognitive	.326*	.440**			
	4.TotalAESemotional	.270	.258	.699**		
	5.TotalAESbehavioral	.436**	.491**	.828**	.630**	

Note: * $p < 0.05$, ** $p < 0.01$ (2-tailed).

$N = 44$

Total ADL basic = total score for basic ADLs, Total ADL instrumental = total score for instrumental ADLs, Total AES cognitive = total score for cognitive apathy, Total AES emotional = total score for emotional apathy, Total AES behavioural = total score for behavioural apathy

Although only Spearman's rho correlation will be reported in this analysis, Pearson correlation was also performed. The results showed a significant moderate to high correlation between the two types of ADLs which is not surprising since they tap into one underlying construct. Basic ADLs had a weak significant correlation with cognitive apathy which again, was not surprising since we expect basic ADLs to require little thought and planning to execute. There was no observed correlation between basic ADLs and emotional apathy. However, there was a significant moderate correlation between basic ADLs and behavioural apathy. This finding confirms the prediction made earlier that basic ADLs will be significantly correlated with behavioural apathy which mostly has to do with the ability to engage in the act of doing. While Instrumental ADLs had significant moderate correlations with both behavioural and cognitive apathy symptoms, no significant correlations were observed between Instrumental ADLs and emotional apathy. This result also the confirms our hypothesis that Instrumental ADLs will be related to cognitive apathy as these are activities

that require planning in order for an individual to be able to execute such activities. There was no correlation between emotional apathy and Basic ADLs. All the sub-scales of apathy correlated highly with one another. These correlations are presented in Table 1 above.

Factoring Depression into the model

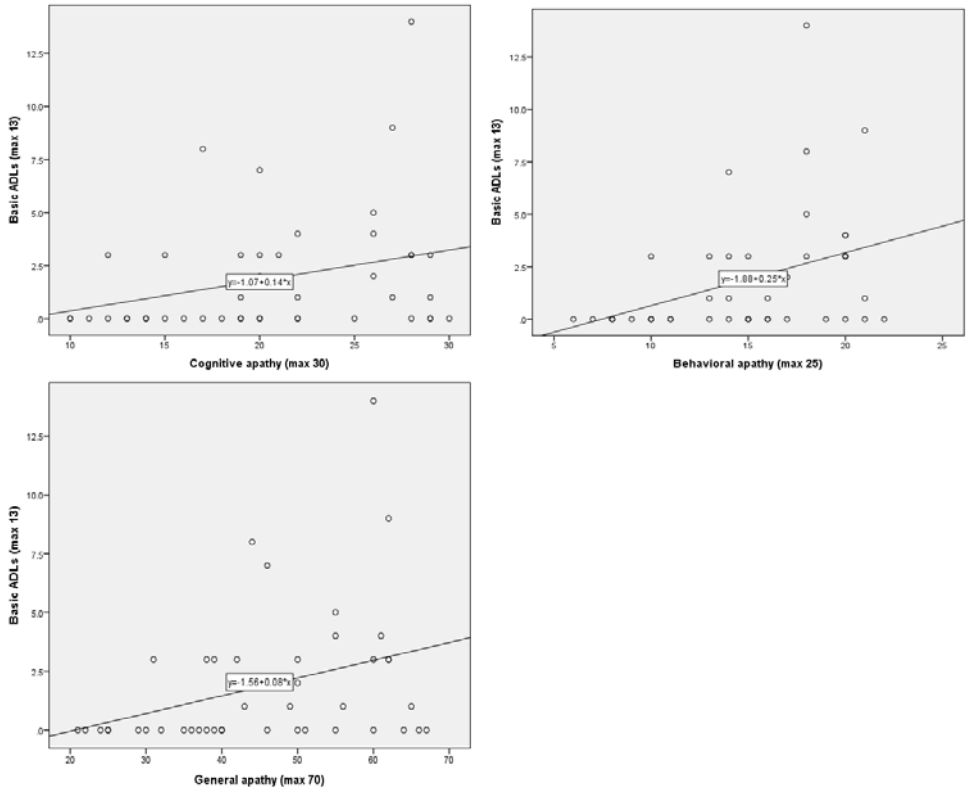

Figure 4. Scatter plot of apathy against basic ADLs

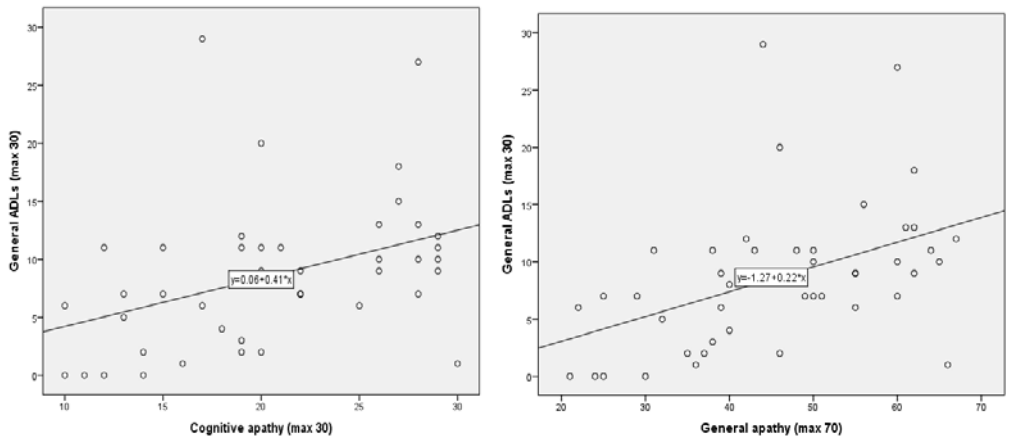

Figure 5. Scatter-plot of apathy and total ADLs

Before any regression models were performed, diagnostic tests in the form of scatter-plots (see Figure 4 and 5 above) were plotted to see if the data was suitable for a regression. Separating the types of ADLs did not seem beneficial as there was no possibility of adding a fitting straight line that will accommodate the majority of the data points. A consensus was

reached to use total ADL score as the outcome measure, as this variable had a linear relationship with the apathy subscales.

Hierarchical Regression Analysis

Factoring depression into the model, a hierarchical regression model was computed to investigate whether the relationship between ADLs and apathy was not explained for by the presence of depression. Apathy and depression tend to co-occur and sometimes the two diagnoses are confused. In the first regression model, total depression score was added in block one and total apathy score in block two, with total ADLs as the outcome variable. This multiple regression analysis showed that depression explained 22% of the variance observed in the outcome variable ($R^2 = .220$, F (1, 42) = 11.8, $p < .001$). Apathy alone did not explain enough variance as it only explained 7% falling just at borderline significance ($R^2 = .287$, F (1, 41) = 3.87, $p = .056$). In this model depression significantly predicted performance of ADLs ($\beta = .33$, $p < .035$) while apathy was not a significant predictor of performance of ADLs ($\beta = .30$, $p = .056$). Part and partial correlations show that apathy on its own correlates well with ADLs (i.e. the more apathetic one is the more impairment on performance of ADLs), however, when depression is added, apathy correlates less with ADLs. The collinearity statistics show that apathy and depression are not very strongly inter-correlated, with the Tolerance and VIF values of .77 and 1.30 respectively. It should be noted that the hierarchical regression is close to being significant and also that we had less power due to small sample size and that may affect the results, as such it is advisable to not just discard this results.

Hierarchical Regression Analysis Two

After looking at the collinearity statistics of the first regression, a decision was made to run a second regression analysis with a refined depression scale in which items related to apathy (motivation) were excluded from the analysis. Apathy related items were removed from the depression scale to reduce the chances of the two variables investigating the same thing (i.e. motivation and interest) as a result reducing shared variance and also to reduce chances of multicollinearity (Field, 2009). Again depression was entered in model one and apathy in the second model which also included depression as predictor variables. Depression accounted for 25% of the variance ($R^2 = .245$, F (1, 42) = 13.6, $p < .001$). This time apathy accounted for a significant portion of the variance in ADLs ($R^2 = .324$, F (1, 41) = .4.82, $p <$ .034). Results of the regression are presented in Table 2 below.

Table 2. Summary for Depression and Apathy predicting performance of ADLs

	Model 1			Model 2		
Variable	*B*	*SE B*	*B*	*B*	*SE B*	*β*
Refined CSD	.705	.191	.495**	.535	.198	.376*
Total AES				.146	.067	.306*
R^2		5.63			5.39	
F for change in R^2		13.6**			4.82*	

*Note:*p* < .05. **p* < .001

Refined CSD is the refined depression score

Total AES is the total apathy score

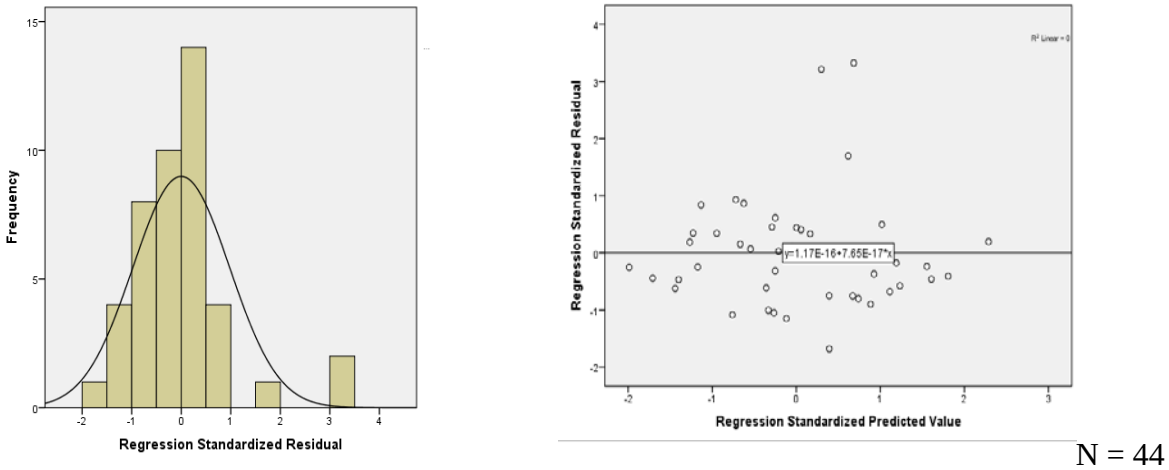

Figure 6. Histogram and Scatter plot for residuals of the regression

The Tolerance and VIF values were .85 and 1.18 respectively; meaning apathy and depression are not the same construct with an increase from the first regression analysis in this values. This analysis accounted for the majority of the participants with almost 99% of people falling within 3 standard deviations from the mean. Despite the small sample size of 44 patients the results show that there is a case to be made for apathy as a predictor of performance of ADLs, since in the first analysis it was almost significant, and in the second, once apathy items were removed from the depression scale, it was significant. High caution however, should be exercised before these results can be used to try to make generalizations

beyond the patients used in this study. Residuals were plotted for this analysis, and although the distribution is not perfect, there are no worrisome skews. The distribution of residuals is displayed in Figure 6 above.

Discussion

To the best of our knowledge, no study has ever specifically investigated the relationship between the specific sub-domains of apathy and basic ADLs and instrumental ADLs; this is the first of its kind. The current study examined whether there is a relationship between each sub-domain of apathy i.e. affective, behavioural and cognitive symptoms of apathy, and both basic and instrumental activities of daily living.

The findings of the present study indicated significant correlations between cognitive apathy and both IADLs and BADLs. And as was expected, behavioural apathy symptoms were also significantly correlated with both IADLs and BADLs whereas there were no significant correlations between affective apathy and either type of ADLs. We also found that apathy was not predictive of ADLs when put in a regression model with depression, but after removing apathy related items i.e. CSDD 3 and CSDD 8, from the depression scale (CSDD), apathy was predictive of ADLs. This finding goes to show that apathy and depression have a shared symptomatology as it can be observed from this finding that initially, those two CSDD variables explained most of the variance (as depressive symptoms) that reflected apathy. This is an interesting finding because, according to Njomboro and Deb (2014), their findings indicated that apathy was not predictive of depression. Yet, when apathy-related items were removed from the CSDD scale, apathy became predictive of ADLs. One could easily expect to observe a correlation between apathy and depression given their shared symptomatology and overlapping content. The main findings of this study are discussed below in further detail.

Cognitive apathy and ADLs

We found a significant correlation between cognitive apathy and IADLs. This result was expected because based on the literature we reviewed and based our hypothesis of this relationship, cognitive symptoms of apathy are associated with deficits in executive functioning (Njomboro & Deb, 2014). Similarly, performance of IADLs reflects an involvement of high-order functions (Mioshi et al., 2007) and hence, a disturbance in high order functions (cognitive apathy), would predict impairments in the performance of IADLs. Levy and Dubois (2006) also showed a reduction in goal directed behaviours due to deficits in high order functions. This finding is further explained by the common neuroanatomical

bases of both cognitive apathy symptoms and IADLs as the same brain regions are implicated in both these symptoms (Mioshi et al., 2007).

Significant correlations were also observed between cognitive apathy and BADLs. Similarly, these findings make sense because, given that Mioshi et al. (2007) found that the execution of BADLs still involve the frontal cortex. This is expected because Nadkarni et al. (2012) showed that performance of a behaviour involves three stages of which planning is involved. Hence, as much as feeding or bathing might be a less complex activity (Mioshi et al., 2007), an individual still needs to plan for such an activity. This could explain the involvement of the frontal cortex in the performance of BADLs and hence, frontal atrophies associated with both BADLs and cognitive apathy symptoms could explain the BADL dysfunctions observed in AD patients.

Behavioural apathy symptoms and ADLs

Our findings indicated a significant correlation between behavioural apathy symptoms and IADLs. As explained above, the performance of IADLs involve three stages including initiation, planning and performance (Nadkarni et al., 2012). According to Levy and Dubois (2006), behavioural apathy is better termed as 'auto activation deficits' because enclosed within this terminology, is a reflection of the difficulties involved in automatically activating thoughts and initiating motor programs that are required to successfully perform an activity. Thus, since performing IADLs require high order functioning, for example, shopping, managing finances, orientation to both time and space, it makes sense that fronto-parietal atrophy which leads to auto-activation deficits (behavioural apathy), could result on dysfunctions in the performance of IADLs. Hence, our finding is consistent with the neuroanatomical findings of both ADLs and behavioural apathy.

We also found that behavioural apathy was significantly correlated with BADLs. This finding is in accordance with the neural correlates of both BADLs and behavioural apathy. Mioshi et al. (2013) found that BADLs were associated to frontal atrophy. These findings are suggestive that the performance of the BADLs could be reliant on the behavioural changes observed in AD. Hence, the behavioural apathy symptoms in AD could be predictive of the dysfunctions in BADLs.

Conclusion

The results of this study suggest that apathy is associated with activities of daily living. More specifically, each sub-domain of apathy has a unique association with both IADLs and BADLs. Investigating apathy as a multidimensional syndrome can be the most useful approach to understanding apathy and may be of a greater benefit to both clinical

practice and research. This approach accommodates the fact that all the processes involved in the performance of goal-directed behaviours are complex and may involve functions ranging from processing the nature of the behaviour to be performed, to the processes involved in planning and high order functions, to functions that eventually execute motor performance. Hence different regions of the brain are involved at each level of these processes and the physiopathology of apathy and either IADL or BADL is determined by specific process that would be disturbed during performance of any given goal directed behaviour.

Limitations of the study

This study faced several potential limitations including a small sample size. While smaller sample sizes limit the power of the findings of a study, bigger sample sizes reinforce relationships between the constructs under study, thus strengthening the power of the findings. Hence, caution is mandatory when interpreting results from a small sample size study. Furthermore, the conceptualization of apathy is not yet clear, and building a sound theoretical framework to use when investigating apathy may become challenging due to the inconsistencies on the available literature. Therefore, the findings of this study need to be replicated with a bigger sample size and different ways of investigating these relationships, for instance, investigating the relationship between apathy sub-domains and ADLs in non-AD apathetic individuals in order to rule out any confounding factors in the relationship between apathy and functionality. A study like that may prove to be crucial if apathy is to be treated as a distinct disorder in future.

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APPENDICES

Appendix A

MEMORY CLINIC

Clerking Notes
Scales

Folder number:								Record number:			

Patient: _____

				2	0		

***Examiner*:**

- *Ensure patient identification information is recorded above.*

- *Enter scores at corresponding numbers in the<u>Assessment Information Booklet</u>*

Section N: Scales

Administer the scales as appropriate. Enter the score in each case in Section N in the Assessment Information Booklet.

N1 Bristol Activities of Daily Living Scale (modified)

N2 Cornell Scale for Depression

N3 Apathy Evaluation Scale (Informant)

N1 **Bristol Activities of Daily Living Scale (modified)**

Instruction: *C*ircle the response that best describes the patient's level of ability to perform that activity. Only one box should be marked for each activity. Where in doubt, choose the level of ability which represents the patient's average performance over the past two weeks.

1. **Food**

A Selects and prepares food	0
B Able to prepare food only if ingredients are set out	1
C Able to prepare food only if shown step by step	2
D Unable to prepare food	3
E Not applicable	0

2. **Eating**

A Eats as previously	0
B Eats appropriately if food is made manageable and/or uses a spoon	1
C Needs someone to help guide food to mouth	2
D Needs to be fed	3
E Not applicable	0

3. **Drink**

A Able to make tea/coffee as previously	0
B Able to make tea/coffee only if ingredients are set out	1
C Able to make tea/coffee only if shown step by step	2

D Unable to make tea/coffee	3
E Not applicable	0

4. **Dressing**

A Dresses as previously	0
B Puts clothes on incorrectly or inappropriately	1
C Unable to dress self but moves limbs to assist	2
D Has to be dressed	3
E Not applicable	0

5. **Hygiene**

A Washes self as previously	0
B Able to wash self if given soap, towel and water	1
C Able to wash self but needs help	2
D Has to be washed	3
E Not applicable	0

6. **Teeth**

A Cleans teeth as previously	0
B Cleans teeth only if given water and toothpaste or gargle	1
C Able to clean teeth but needs help	2
D Unable to clean teeth	3
E Not applicable	0

7. **Toilet**

A Uses toilet as previously	0
B Able to use toilet (or bucket) if helped	1
C Incontinent of urine	2
D Incontinent of urine and faeces	3
E Not applicable	0

8. **Transfers**

A Able to get in/out of a chair as previously	0
B Able to get in a chair but needs help to get out	1
C Needs help getting in/out of a chair	2
D Has to be lifted in/out a chair	3
E Not applicable	0

9. **Mobility**

A Walks independently	0
B Walks with assistance, i.e. furniture, arm for support	1
C Uses aid to walk, i.e. cane, frame	2
D Unable to walk	3
E Not applicable	0

10. **Orientation –Time**

A Fully orientated to time/day/date, etc.	0
B Unaware of time/day/date but seems unconcerned	1
C Repeatedly asks the time/day/date	2

D Mixes up night and day	3
E Not applicable	0

11. **Orientation – Space**

A Fully orientated to surroundings	0
B Orientated to familiar surroundings only	1
C Gets lost in home, needs reminding where toilet is	2
D Does not recognise own home	3
E Not applicable	0

12. **Communication**

A Able to hold appropriate conversation	0
B Understands others and tries to respond verbally with gestures	1
C Can make self understood but has difficultyunderstanding others	2
D Does not respond to or communicate with others	3
E Not applicable	0

13. **Telephone**

A Uses telephone appropriately	0
B Uses telephone with help	1
C Answers telephone but does not make calls	2
D Unable/unwilling to use telephone	3
E Not applicable	0

14. **Housework/gardening**

A	Able to do housework/gardening to previous standard	0
B	Able to do housework/gardening but not to previous standard	1
C	Limited participation in housework/gardening	2
D	Unwilling/unable to participate in previous housework/gardening activities	3
E	Not applicable	0

15. **Shopping**

A	Shops to previous standard	0
B	Only able to shop for 1 or 2 items without a list	1
C	Unable to shop alone, but participates when accompanied	2
D	Unable to participate in shopping even when accompanied	3
E	Not applicable	0

16. **Finances**

A	Manages own finances as previously	0
B	Recognises money values and can sign name	1
C	Does not recognise money values but can sign name	2
D	Unable to sign name or recognise money values	3
E	Not applicable	0

17. **Transport**

A	Able to drive, cycle or use public transport independently	0
B	Unable to drive but uses public transport, bike, etc.	1

C	Unable to use public transport alone	2
D	Unable or unwilling to use public transport even when accompanied	3
E	Not applicable	0

Score: Add encircled numbers for 17 activity domains

Maximum Score: 51

Total "not applicable" activities

N2 **Cornell Scale for Depression**

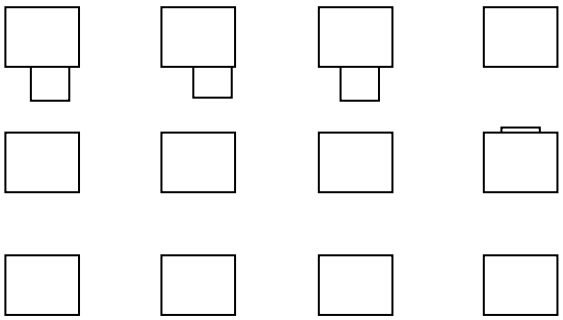
Instruction: Tick the appropriate box for each item.

	Unable to evaluate (U)	Absent (0)	Mild or intermittent (1)	Severe (2)
A. **Mood-related signs**	☐	☐	☐	☐
1 Anxiety (anxious expression, ruminations, worrying)	☐	☐	☐	☐
	☐	☐	☐	☐
2 Sadness (sad expression, sad voice, tearfulness)	☐	☐	☐	☐
3 Lack of reactivity to pleasant events				
4 Irritability (easily annoyed, short-tempered)				
B. **Behavioural disturbances**	☐	☐	☐	☐
5 Agitation (restlessness, hand-wringing, hair pulling)	☐	☐	☐	☐
	☐	☐	☐	☐
6 Retardation (slow movements / speech / reaction)	☐	☐	☐	☐

7 Multiple physical complaints
(*score 0 if GI symptoms only*)

8 Loss of interest
(less involved in usual activities; *score only if change occurred acutely, i.e. in less than one month*)

C. **Physical signs**



9 Appetite loss
(eating less than usual)

10 Weight loss
(*score 2 if greater than 2 kilos in one month*)

11 Lack of energy
(fatigues easily, unable to sustain activities; *score only if change occurred acutely, i.e. in less than one month*)

Unable to evaluate (U)	Absent (0)	Mild or intermittent (1)	Severe (2)

D. **Cyclic functions**

12 Diurnal variation of mood
(symptoms worse in the morning)

13 Difficulty falling asleep
(later than usual for this individual)

14 Multiple awakenings during sleep

15 Early morning awakening
(earlier than usual for this individual)

E. **Ideational disturbance**

16 Suicide
(feels life is not worth living, has suicidal wishes, or makes suicide attempts)

17 Poor self-esteem
(self-blame, self deprecation, feelings of failure)

18 Pessimism
(anticipation of the worst)

19 Mood-congruent delusions
(delusions of poverty, illness or loss)

Score: Add the number received for each item.

Score < 6: Absence of depressive symptoms

Score >10: Probable major depression

Score >18: Definite major depression

Maximum Score: 38 ☐

Total unable to evaluate ☐

Apathy Evaluation Scale (Informant)

Name: _____ Date: ___/___/___

Informant's Name: _____ Relationship:_____

For each statement, circle the answer that best describes the subject's thoughts, feelings, and activity in the past 4 weeks.

1. S/he is interested in things.

NOT AT ALL	SLIGHTLY	SOMEWHAT	A LOT
(4)	(3)	(2)	(1)

2. S/he gets things done during the day.

NOT AT ALL	SLIGHTLY	SOMEWHAT	A LOT
(4)	(3)	(2)	(1)

3. Getting things started on his/her own is important to him/her.

NOT AT ALL	SLIGHTLY	SOMEWHAT	A LOT
(4)	(3)	(2)	(1)

4. S/he is interested in having new experiences.

NOT AT ALL	SLIGHTLY	SOMEWHAT	A LOT
(4)	(3)	(2)	(1)

5. S/he is interested in learning new things.

NOT AT ALL	SLIGHTLY	SOMEWHAT	A LOT
(4)	(3)	(2)	(1)

6. S/he puts little effort into anything.

NOT AL ALL	SLIGHTLY	SOMEWHAT	A LOT
(1)	(2)	(3)	(4)

7. S/he approaches life with intensity.

NOT AT ALL	SLIGHTLY	SOMEWHAT	A LOT
(4)	(3)	(2)	(1)

8. Seeing a job through to the end is important to him/her.

NOT AT ALL	SLIGHTLY	SOMEWHAT	A LOT
(4)	(3)	(2)	(1)

9. S/he spends time doing things that interest him/her.

NOT AT ALL	SLIGHTLY	SOMEWHAT	A LOT
(4)	(3)	(2)	(1)

10. Someone has to tell him/her what to do each day.

NOT AT ALL	SLIGHTLY	SOMEWHAT	A LOT
(1)	(2)	(3)	(4)

11. S/he is less concerned about her/his problems than s/he should be.

NOT AT ALL	SLIGHTLY	SOMEWHAT	A LOT
(1)	(2)	(3)	(4)

12. S/he has friends.

NOT AT ALL	SLIGHTLY	SOMEWHAT	A LOT
(4)	(3)	(2)	(1)

13. Getting together with friends is important to him/her.

NOT AT ALL	SLIGHTLY	SOMEWHAT	A LOT
(4)	(3)	(2)	(1)

14. When something good happens, s/he gets excited.

NOT AT ALL	SLIGHTLY	SOMEWHAT	A LOT
(4)	(3)	(2)	(1)

15. S/he has an accurate understanding of her/his problems.

NOT AT ALL	SLIGHTLY	SOMEWHAT	A LOT
(4)	(3)	(2)	(1)

16. Getting things done during the day is important to her/him.

NOT AT ALL	SLIGHTLY	SOMEWHAT	A LOT
(4)	(3)	(2)	(1)

17. S/he has initiative.

NOT AT ALL	SLIGHTLY	SOMEWHAT	A LOT
(4)	(3)	(2)	(1)

18. S/he has motivation.

NOT AT ALL	SLIGHTLY	SOMEWHAT	A LOT
(4)	(3)	(2)	(1)

The Apathy Evaluation Scale was developed by Robert S. Marin, M.D. Development and validation studies are described in RS Marin, RC Biedrzycki, S Firinciogullari: "Reliability and Validity of the Apathy Evaluation Scale, "*Psychiatry Research*, 38:143-162, 1991.

Total score ____