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Developing a new apathy measurement scale: dimensional apathy scale

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Abstract

Apathy is both a symptom and syndrome prevalent in neurodegenerative disease, including motor system disorders, that affects motivation to display goal directed functions. Levy and Dubois (2006) suggested three apathetic subtypes, Cognitive, Emotional-affective and Auto-activation, all with discrete neural correlates and functional impairments. The aim of this study was to create a new apathy measure; the Dimensional Apathy Scale (DAS), which assesses apathetic subtypes and is suitable for use in patient groups with motor dysfunction. 311 healthy participants (mean = 37.4, SD = 15.0) completed a 45-item questionnaire. Horn's parallel analysis of principal factors and Exploratory Factor Analysis resulted in 4 factors (Executive, Emotional, Cognitive Initiation and Behavioural Initiation) that account for 28.9% of the total variance. Twenty four items were subsequently extracted to form 3 subscales – Executive, Emotional and Behavioural/Cognitive Initiation. The subscale items show good internal consistency reliability. A weak to moderate relationship was found with depression using Becks Depression Inventory II. The DAS is a well-constructed method for assessing multidimensional apathy suitable for application to investigate this syndrome in different disease pathologies.

Keywords: apathy subtypes; multidimensional apathy; motivation; apathy scale; depression; motor dysfunction

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1. Introduction

Apathy has been defined as reduced motivation towards goal directed behaviours (Marin, 1996). This can often be observed overtly as a loss of energy, interests and emotion (Marin, 1991). In a healthy population, apathy is a fluctuating state that is frequently experienced by many individuals. This is known as selective or relative apathy, where an individual is not interested or motivated towards particular activity (Marin, 1990). It is observable in normal populations (Brodaty et al., 2010). However, when this state reoccurs or becomes constant it may be indicative of underlying pathology impairing motivational functioning and is regarded as a prevalent symptom in neuropsychiatric and neurodegenerative populations (for review see Chase, 2011).

The concept of apathy is thought to be composed of several elements pertaining to emotion, cognition and behaviour (Marin, 1991), the evidence for which has been observed through a review of neurological findings (Levy and Dubois, 2006; Levy, 2012). Based on observations of patients with prefrontal cortex and basal ganglia lesions Levy and Dubois (2006) proposed three underlying apathetic subtypes (see Table 1). While these three subtypes have overlapping similarities to Marin's proposed triadic cognitive-behavioural-emotional structure, they differ in the Auto-activation subtype, which is defined by problems with initiation of behaviours and cognition.

Table 1. Apathy subtypes (adapted from Levy and Dubois, 2006)

| Subtype | Description |
|---------------------|---|
| Cognitive | The inability to manage goals and cognitively strategize with a negative impact on cognitive and action planning. |
| Emotional-affective | Diminished integration, processing and expression of emotional behaviours and cognition resulting in a continuous lack of extreme affect. |
| Auto-activation | Lessened initiation of thoughts or behaviours that are related to functionality (i.e. lack of motor responsiveness (akinesia) and lack of discourse (alogia, Habib, 2004)). |

In Cognitive apathy, or 'Cognitive inertia' (Levy and Dubois, 2006) the goal directed behaviour is reduced due to impaired cognitive functions needed to implement planned actions. This is similar to dysfunction of executive processes, which are necessary to achieve

goals, including planning, organisation, attention monitoring. These processes are strongly associated with dysfunction of the dorsolateral prefrontal cortex damage (Fuster, 1999; for review see Stuss, 2011).

Apathy and depression have overlapping symptomology (van Reekum et al., 2005) but an important distinction exists in that apathy relates to disorders of motivation where depression is an affective disorder (Levy et al., 1998). The Emotional-affective subtype of apathy can be distinguished from depression due to the presence of emotional neutrality, whereas depression results in either extreme sadness or, in the case of bi-polar affective disorder, also happiness. It has been suggested that dysfunction of the orbito-medial prefrontal cortex was associated with this type of apathy (Levy and Dubois, 2006). The orbito-medial prefrontal cortex regions are connected to areas, which facilitate emotional processing of information pertaining to goal directed behaviour (Levy and Dubois, 2006). Damage to the orbito-medial prefrontal cortex is suggested to disrupt the flow of emotional processing which may result in reduced processing of emotional behaviour, context or outcome. Damage to such systems could disrupt the motivation for goal directed behaviour due to emotional desensitisation to both positive and negative stimuli. The emotional ambivalence may influence decision making due to lack of emotional context.

Finally, the Auto-activation apathetic deficit has been observed as early as 1981 by Laplane (in Habib, 2004) as “loss of psychic auto-activation” associated with the presence of structural neuroimaging abnormalities in of the globi palli and is most commonly characterised by decreased cognitive and physical initiative activity. Specifically, lesions to the medial prefrontal cortex and basal ganglia have been found to manifest as Auto-activation deficits akin to apathy (Levy and Dubois, 2006). Levy and Czernecki (2007) suggested that lesions in the basal ganglia were associated with reduced goal directed behaviour due to disconnectivity with the frontal lobes.

The concept of apathy as multidimensional has gained widespread recognition (Marin et al. 1991; Cummings et al., 1994; Robert et al., 2002; Sockeel et al., 2006; Starkstein and Leentjens, 2008). Furthermore diagnostic criteria for apathy in Alzheimer’s disease and other neuropsychiatric disorders have been proposed, based on a consensus of an international task force of experts in neuropsychiatric symptoms in neurodegenerative disease (Robert et al., 2009). The criteria have been sub-divided into three symptom-domains representing

behavioural apathy, cognitive apathy and emotional apathy concordant with Marin's original subclassification and highlighting the need for multidimensional assessment.

However, despite this view, there is a lack of objective tools to evaluate the different subtypes (Levy, 2012) and apathy is most typically assessed as a singular concept (for review see Clarke et al., 2011), examples of which include Marin's Apathy Evaluation Scale (Marin et al., 1991), Neuropsychiatric Inventory apathy subscale (Cummings et al., 1994), the Frontal Systems Behavioural Scale – apathy subscale (Grace and Malloy, 2001) and scales assessing negative symptoms (Andreasen, 1982; Kay et al., 1989). In patients with schizophrenia, research using the Scale for Assessment of Negative Symptoms has shown a substructural structure to negative symptoms (Blanchard et al., 2006). This has prompted the development of novel and more comprehensive assessment methods for negative symptoms in schizophrenia, examples being the Brief Negative Symptoms Scale (Kirkpatrick et al., 2011) and the Clinical Assessment Interview for Negative Symptoms (Kring et al., 2013). These new methods have resulted in a new 2 dimensional substructure of negative symptoms composed of Apathy-Avolition and Diminished Expression. The former is defined by blunted affect and alogia whereas the Diminished expression subtype is associated with anhedonia, asociality and avolition (Foussias and Remington, 2010). However, these profile subgroups are fairly new concepts and the scales detecting them have only recently been used in research practice.

The only established apathy measures that recognised the presence of an apathetic substructure through its assessment method are the Lille Apathy Rating Scale (Sockeel et al., 2006) and Apathy Inventory (Robert et al., 2002). The latter includes only one item per dimension and so does not provide a comprehensive assessment, while validation of the Lille Apathy Rating Scale in Parkinson's Disease patients, revealed a four factor structure; intellectual curiosity, self-awareness, emotion and action initiation (Sockeel et al., 2006) which did not map onto the established triadic structure – of cognitive, emotional and behavioural classifications. Further use of the Lille Apathy Rating Scale subsequently focused on the total summative score of apathy despite evidence of multiple dimensions. Furthermore, the limited utility of some measurements in the comprehensive assessment of apathy is further confounded in patients with physical disability. Apathy is a common symptom in neurodegenerative disease in which motor system dysfunction is a typical feature for example amyotrophic lateral sclerosis (Girardi et al., 2011; Woolley et al., 2011) and

Parkinson’s disease (Pedersen et al., 2009). However, questionnaires typically include statements that rely on performing physical activity and apathy measurement may be falsely inflated as a consequence (Goldstein and Abrahams, 2013).

The aim of this research was to develop a new method of assessing apathy, the Dimensional Apathy Scale (DAS), a multi-dimensional approach based on Levy and Dubois’ (2006) apathetic subtypes. Furthermore, in order to accommodate for the assessment of apathy in patients with motor dysfunction the scale was designed to minimize exaggeration of symptom due to physical disability.

Specifically, published scales were initially reviewed to identify questions, which would yield a triadic structured questionnaire according to Levy and Dubois’ (2006) apathetic subtypes and produce the DAS. Firstly, the psychometric properties of this 45-item scale were initially investigated and a 24-item scale developed. Secondly, the relationship between performance on the new scale and a standardized measure of depression was explored.

2. Method

2.2. Participants

A total of 311 participants (217 females and 94 males) were recruited from the University of Edinburgh Departmental volunteer panel, the University of Hull and other volunteer groups. The majority of participants came from the University of Edinburgh Departmental volunteer panel. Participants were only asked to take part if they were healthy and the volunteer panel database was pre-screened to exclude participants with medical conditions. Table 2 shows the breakdown of sample characteristics. The study was approved by the University of Edinburgh, School of Philosophy, Psychology and Language Sciences (Psychology) Ethics committee.

Table 2. Sample Characteristics

| Questionnaire Type | N | Mean Age (SD) | Min Age | Max Age | Mean YOE (SD) |
|--------------------|-----|---------------|---------|---------|---------------|
| Online | 266 | 37.7 (14.7) | 20 | 67 | 17.3 (3.0) |
| Paper and pencil | 50 | 35.6 (16.5) | 18 | 70 | 16.8 (2.7) |
| Total | 311 | 37.4 (15.0) | 18 | 70 | 17.2 (3.0) |

2.3. Item Development

A deductive scale development method (Clark and Watson, 1995) was utilized. Firstly, apathy domains were defined by the characteristics of the Emotional-affective, Auto-activation and Cognitive Levy and Dubois (2006) apathy subtypes (see Table 1). This was followed by a review of total of 180 items from 12 existing English apathy scales and subscales (shown in Table 3). Additionally, items that evaluated executive functioning based on the Behavioural Assessment of Dysexecutive Syndrome-DEX (Norris and Tate, 2000), Frontal Systems Behaviour scale (Grace et al., 1999) and the Brief Psychiatric Rating scale (Overall and Gorham, 1962), were included in the review because they were found to be consistent with the definition of Cognitive apathy subtype.

Following the review, common themes which were concordant with definitions of the three dimensions of apathy were determined by the two authors from the 180 existing items, which was followed by a structured design of new items, resulting in a new 45-item scale¹. Both positive and negative syntax were employed when writing the new items. The new items were designed to be self-rated using the 4-point Likert scale (Hardly Ever, Occasionally, Often, Almost always) on rate of occurrence in the last month. Scoring was 0, 1, 2, 3 respectively, with reverse scoring for some items.

¹ See Supplementary material

Table 3. Apathy scales reviewed in development of DAS

| Scale | Type | Number of Items Extracted | Reference |
|---|-----------|---------------------------------|------------------------------|
| Apathy Inventory | Full | 8 | Robert et al. (2002) |
| The Behavioural Assessment of Dysexecutive Syndrome- DEX | Sub-scale | 20 | Norris and Tate (2000) |
| Brief Psychiatric Rating scale | Sub-scale | 5 | Overall and Gorham (1962) |
| Dementia Apathy Interview and Rating | Full | 16 | Strauss and Sperry (2002) |
| Apathy Evaluation Scale | Full | 18 | Marin et al. (1991) |
| Frontal Systems Behaviour scale | Sub-scale | 27 | Grace et al. (1999) |
| Irritability Apathy scale | Sub-scale | 5 | Burns et al. (1990) |
| Key Behaviour Change Inventory | Sub-scale | 28 | Belanger et al. (2002) |
| Lille Apathy Rating scale | Full | 28 | Sockeel et al. (2006) |
| Neuropsychiatric Inventory | Sub-scale | 9 | Cummings et al. (1994) |
| Positive and Negative Symptoms scale | Sub-scale | 8 | Kay et al. (1989) |
| Assessment of Negative Symptoms | Sub-scale | 8 | Andreasen (1982) |

2.4. Procedure

Two hundred and sixty six participants completed an online 45-item questionnaire using Limesurvey, a free and open source survey software tool. Fifty participants completed a paper and pencil version of the 45-item questionnaire accompanied by completion of the Becks Depression inventory II (BDI-II; Beck et al., 1996) either at the University of Edinburgh or in the participant's home. All participants were informed that if they had any existent medical or psychiatric conditions, they were not eligible to participate in this study. As there were no significant differences between the participant characteristics or responses of those who completed the online and paper and pencil versions the dataset was combined to investigate the psychometric properties of the items.

2.5. Statistical analysis

In stage 1 of the analysis a Monte-Carlo based simulation, Horn's parallel analysis of principal factors (Horn, 1965, Turner, 1998), was used in comparing eigen values derived from uncorrelated normal variables to the observed eigen values. It was used to determine the number of factors to be extracted. An exploratory factor analysis was conducted on the 311 responses to the 45 items with a factor loading cut off of ≥ 0.350 (Kline, 1994) to determine the factorial substructure of the scale.

In stage 2, inter-item and item-subscale total correlational analysis (Pearson product moment correlation) was performed for the 24 items of the new scale. Subscale total was calculated by summing values of items associated with each subscale.

In stage 3, data from the 50 participant subsample who performed the paper and pencil version of the 45 item scale was used to explore relationship between depression and subscale item total scores of the 24 items of the new scale. This was done using Pearson product moment correlation.

3. Results

3.1. Stage 1- Factorial Substructure

Due to the larger number of female participants in the sample; a regression analysis was initially undertaken on each item response in relation to gender from which the residuals were extracted. Through examination of histograms and kurtosis of item responses, they were shown to be normally distributed. The Kaiser-Meyer-Olkin (KMO) and Mean Measure of Sample Adequacy (MSA) showed the sample to be factorable (KMO = 0.837, Mean MSA = 0.800). Horn's parallel analysis of principal factors, the use of the characteristic "elbow" or steep decline in eigen values (Cattell, 1966), indicated four factors to be extracted.

An Exploratory Principle Axis Factor Analysis with Promax (Oblique) rotation- due to factor 1 (PA1) and factor 4 (PA4) being inter-correlated was used for data analysis (see Table 4). Eleven items were excluded due to them not meeting the ≥ 0.350 factor loading cut-off. The 4-factor solution cumulatively accounted for 28.9% of the total variance. This was further supported by visual inspection and a suitable square root mean residual (SRMR <

0.05). The factors were subsequently labelled based on the themes of the items loading on to them.

Table 4. Oblique rotation Exploratory Principle Axial Factor analysis and factor labels Executive (Ex), Emotional (Em), Cognitive Initiation (CI) and Behavioural Initiation (BI)

| Numbered Factor | Factor Labels | Eigen Values | Proportion % Variance | Cumulative % Variance | Number of items |
|-----------------|---------------|--------------|-----------------------|-----------------------|-----------------|
| PA1 | Ex | 5.785 | 12.9 | 12.9 | 17 |
| PA4 | Em | 2.784 | 6.2 | 19.0 | 8 |
| PA3 | CI | 2.373 | 5.3 | 24.3 | 5 |
| PA2 | BI | 2.067 | 4.6 | 28.9 | 5 |

Seventeen items loaded on PA1, accounting for 12.9% of the total variance, one of which loaded negatively. It is clear that items loading on PA1 were similar to that described by Levy and Dubois as the Cognitive apathy subtype. However, the items specifically related to processes of organisation, (e.g. “When doing a demanding task, I have difficulty working out what to do”), attention (e.g. “I find it difficult to keep my mind on things”) and planning (e.g. “I set goals for myself”) abilities. As such these processes may be best described under the umbrella of executive functions (Burgess and Alderman, 2004). This factor was subsequently labelled as Executive apathy. A total of eight items were subsequently used to create the Executive apathy subscale according to their high loadings. Some higher loading items were not used due to their respective similarities to other items.

Eight items loaded on PA4, accounting for 6.2% of the total variance. There was an emotional theme to this item cluster similar to the Emotional-affective subtype defined by Levy and Dubois. However, the items contained no reference to integration aspects of the Emotional-affective subtype but only that of processing, (e.g. “Before I do something I think about how other would feel about it”) recognition (e.g. “I struggle to empathise with other people”) and expression (e.g. “I become emotional easily when watching something happy or sad on TV”). This factor was subsequently labelled as Emotional apathy. All eight items were retained for the Emotional apathy subscale part of the 24-item scale.

Five items loaded on factor 3 (PA3) and five items loaded on factor 2 (PA2), accounting for 5.3% and 4.6% of the total variance, respectively. Thematically, both factors were associated with initiation corresponding to the Auto-activation apathy subtype. Items loading on PA2 (e.g. “I plan my days activities in advance”) were labelled as Behavioural Initiation apathy while items loading on PA3 (e.g. “I am spontaneous”) were characteristically more oriented to Cognitive Initiation apathy independent of direct physical activity. Due to the overlapping thematic similarities between PA2 and PA3 alongside being the only factors that contained an item that showed overlapping, above threshold loading (“I think of new things to do during the day”), the items loading on these factors were combined to make a Behavioural or Cognitive Initiation subscale. One item was not used as a Behavioural/Cognitive Initiation subscale measure due to its low loading on PA2 with eight subscale items being retained. This resulted in eight items per apathy subscale that were used to construct the new 24-item apathy scale, the DAS¹.

3.2. Stage 2- Inter-item and Item-Subscale Total Correlations

The following analysis was undertaken on the 24 DAS items only. Internal consistency reliability was established using Cronbach’s standardized α . Between items α value for the 24-item scale was 0.798. The item-subscale total correlations were found to be moderate for each subscale, with the Executive subscale correlating most highly (mean $r = 0.639$, SD = 0.081), followed by the Behaviour/Cognitive Initiation subscale (mean $r = 0.541$, SD = 0.085) and then the Emotional subscale (mean $r = 0.495$, SD = 0.133). However, item A16 (“I express/ show my emotions”) assessing the Emotional subscale was found to be of a low correlation ($r = 0.191$), which resulted in adjustment of the wording to “I *express* my emotions” for inclusion in the DAS.

The relationship between subscales total was explored through correlational analysis. The Executive subscale total was found to be most strongly correlated with the Behaviour/Cognitive Initiation subscale total ($r = 0.648$, $p < 0.001$) while being least correlated with the Emotional subscale total ($r = 0.091$, NS), indicating a stronger apathetic executive association with lack of initiation rather than emotional processing. The Behaviour/Cognitive Initiation subscale total held a weak correlation with the Emotional subscale total ($r = 0.236$, $p < 0.001$).

¹ See Supplementary material

3.3. Stage 3- Depression and Subscale Item Total Correlations

The mean BDI-II score from the fifty participants was 5.6 (SD = 5.4), with a range of 0 to 24, which contained no severely depressed participants. All subscale total scores from the 50 participant subsample held moderate positive correlations with depression. BDI-II was most positively and highly correlated with the Executive subscale total ($r = 0.553$, $p < 0.001$) while the Behaviour/Cognitive Initiation total ($r = 0.354$, $p < 0.05$) and Emotional total ($r = 0.365$, $p < 0.01$) subscales were less positively correlated.

4. Discussion

The devised scale was composed of a 4 factor structure akin to Levy and Dubois' (2006) apathetic subtypes and allowing for the creation of a new three dimensional assessment of apathy, the DAS, with Emotional, Executive and Cognitive/Behavioural Initiation subscales.

The Executive factor/subscale was most comparable to Levy and Dubois' Cognitive apathy subtype in that it pertained to organization of thoughts and actions. However it specifically was associated with problems of organization, attention and planning, which as such fall under the umbrella of executive functions (Burgess and Alderman, 2004). Research has shown an association between executive dysfunction and apathy in neurodegenerative disease populations (e.g. Esposito et al., 2010; Varanese et al., 2011). The items derived for the Emotional subscale did not meet the Emotional-affective subtype definition. Levy and Dubois' definition refers to expression, processing and recognition whereas the Emotional subscale items referred to integration of emotional behaviours. Therefore, renaming this subtype to Emotional was justified as it seems to encompass more collective aspects of emotional apathy. The Cognitive and Behavioural Initiation factors and subsequent combined subscale was most similar to the Auto-activation apathy subtype due to the focus being on both initiation of thought and behaviours. However, the Auto-activation apathy subtype was primarily defined by lack of motor responsiveness whereas the themes of the behaviour and cognitive initiation factors were more independent of motor functions. This type of initiation apathy relates to research in to the 'Energization' aspect of executive functioning (Stuss, 2011), which is defined by initiation and sustained response to tasks such as verbal fluency. Increased apathy levels have been observed as a significant predictor of verbal fluency deficits in amyotrophic lateral sclerosis patients (Grossman et al., 2007). Upon closer examination of the two factors, an apparent thematic overlap was found. An example of this

is was the Cognitive Initiation and Behaviour Initiation factors produced the only overlapping above threshold item (“I think of new things to do during the day”). The phrasing of this particular item suggests that there is a relationship between cognition (“think of”) and behaviour (“to do”) primarily based on initiation (“new things”). Due to this overlap and the generally mutual features between items loading on to these two factors, they were combined to produce the Behaviour/Cognitive Initiation subscale.

The new 24-item DAS contained a mixture of negatively and positively phrased items in an attempt to control for acquiescence and social desirability bias. The eight items chosen to assess each subtype were detailed in evaluating symptomatic or syndromatic characteristics related to apathy independent of physical disability. An example of this would be the wording of some items as to avoid direct reference to motor actions. The questionnaire will therefore be suitable to assess apathy in patients with neurodegenerative disease and motor dysfunction such as Parkinson’s disease (Pedersen et al., 2009) and Motor Neurone Disease (Goldstein and Abrahams, 2013).

The methodical, theory-based item design and thorough examination of established items from apathy scales and subscales (for review see Clarke et al., 2011) aimed to increase the effectiveness of this measure. The use of standardized scoring in the form of a Likert scale as a part of the DAS allowed for more efficient measurement of apathy subtypes. Limiting each item to only four choices of response attempted to eliminate possible central tendency bias. Additionally, the internal consistency reliability was high. The item-subscale total correlations were found to be satisfactory.

The apathy scores for each subscale were all found to be positively, moderately associated with depression, but at varying degrees. This is most likely due to the overlap between symptoms of apathy and depression (Levy et al., 1998, van Reekum et al., 2005). In dementia, psychomotor slowing, and deficits in interest, energy and insight have been found to be common in depression and apathy (for review see Ishizaki and Mimura, 2011). A previous review by Tagariello et al. (2009) found at a neurobiological level both apathy and depression relate to decreased activity of frontal, parietal and temporal regions but found apathy to be more related to hypoperfusion of fronto-subcortical regions. At a neurotransmitter level, medications that relieve depression often increase apathy and medication that decreases apathy are not effective antidepressants (Tagariello et al., 2009).

This discrepancy between behavioural symptoms and neural correlates of the two suggests a dissociation between depression and apathy that should further be explored. The low and moderate correlations of the Behaviour/Cognitive Initiation and Emotional subscale total scores with depression could also be interpreted as a degree of separation of these subscales from depression or its influence. The Executive subscale was most highly, albeit moderately, associated with depression. Depression affects a variety of cognitive functions and there is a well-established relationship of impaired executive functioning in depressed individuals (for review see McClintock et al., 2010).

This study investigated apathy in a healthy, normal sample and future studies will look at the structure of apathy and the neuropsychological impairments that are associated with it. However, this relative or selective apathy is observable in a normative population (Marin, 1990; Brodaty et al., 2010); therefore measurable to a diminished severity and variability. We were unable to include the Brief Negative Symptoms Scale (Kirkpatrick et al., 2011) and the Clinical Assessment Interview for Negative Symptoms (Kring et al., 2013) in our item development because they were published after the production of the items for the DAS. These two scales are novel and still underused in research and clinical practice so might not have been suitable at this stage of development.

In Alzheimer's disease patients apathy prevalence in patients was found to be 61% to 92% (e.g. Landes et al., 2005) with an almost equally high prevalence in frontotemporal dementia patients (Mendez et al., 2008). Over a third of Parkinson's disease patients have been found to exhibit apathy (e.g. Pedersen et al., 2009; Pluck and Brown, 2002) with marked variability of its effects on the clinical presentation of Parkinson's disease (Dujardin et al., 2007). Neuroimaging of patients with amyotrophic lateral sclerosis has shown evidence of neuroanatomical correlates relating to apathy and abnormalities in the anterior cingulate gyrus (Woolley et al., 2011). Due to this high prevalence of apathy in a variety of neurodegenerative diseases, there will be an effective method of exploring specific dysfunction of apathetic subtypes within neurological populations.

In conclusion, we have designed a scale, which shows an inherent sub-dimensional structure of apathy in a healthy population. This multi-dimensional scale for detecting apathy subtypes has been designed with intended use in neurodegenerative populations specifically with motor disability. Future research will validate the relationship between these subscales

and determine whether specific subtypes of apathy are disproportionately affected in neurodegenerative diseases. Identification of pathological apathy subtypes will have further implications on choosing the appropriate intervention and care pathway for the individual.

References

- Blanchard, J. J., Cohen, A. S., 2006. The structure of negative symptoms within schizophrenia: implications for assessment. *Schizophrenia Bulletin*, 32(2), 238-245.
- Beck, A. T., Steer, R. A., Brown, G. K., 1996. *Manual for the Beck Depression Inventory, Second Edition (BDII)*. San Antonio, TX: The Psychological Association.
- Belanger, H. G., Brown, L. M., Crowell, T. A., Vanderploeg, R. D., Curtiss, G., 2002. The Key Behaviors Change Inventory and executive functioning in an elderly clinic sample. *The Clinical Neuropsychologist*, 16, 251–257.
- Brody, H., Altendorf, A., Withall, A., Sachdev, P., 2010. Do people become more apathetic as they grow older? A longitudinal study in healthy individuals. *International Psychogeriatrics*, 22, 426–436.
- Burgess, P. W., Alderman, N. 2004. Executive dysfunction. In: L. H. Goldstein L. H., McNeil, J. E. (Eds.), *Clinical neuropsychology: A practical guide to assessment and management for clinicians*. Chichester, UK: Wiley, pp. 185-209.
- Burns, A., Folstein, S., Brandt, J., Folstein, M., 1990. Clinical assessment of irritability, aggression, and apathy in Huntington and Alzheimer disease. *Journal of Nervous and Mental Disease*, 178, 20–26.
- Cattell, R. B., 1966. The scree test for the number of factors. *Multivariate Behavioral Research*, 1, 245–276.
- Chase, T. N., 2011. Apathy in neuropsychiatric disease: diagnosis, pathophysiology and treatment. *Neurotoxicity Research*, 19, 266–278.

- Clark, L. A., Watson, D. 1995. Constructing validity: Basic issues in objective scale development. *Psychological assessment*, 7(3), 309-319.
- Clarke, D. E., Ko, J. Y., Kuhl, E. A., van Reekum, R., Salvador, R., Marin, R. S., 2011. Are the available apathy measures reliable and valid? A review of the psychometric evidence. *Journal of Psychosomatic Research*, 70, 73–97.
- Cummings, J. L., Mega, M., Gray, K., Rosenberg-Thompson, S., Carusi, D. A., Gornbein, J., 1994. The Neuropsychiatric Inventory: comprehensive assessment of psychopathology in dementia. *Neurology*, 44, 2308–2314.
- Dujardin, K., Sockeel, P., Devos, D., Delliaux, M., Krystkowiak, P., Destee, A., Defebvre, L., 2007. Characteristics of apathy in Parkinson's disease. *Movement Disorders*, 22, 778–784.
- Esposito, F., Rochat, L., Van der Linden, A. C. J., Lekeu, F., Quittre, A., Charnallet, A., Van der Linden, M. 2010. Apathy and executive dysfunction in Alzheimer disease. *Alzheimer Disease & Associated Disorders*, 24(2), 131-137.
- Foussias, G., Remington, G. 2010. Negative symptoms in schizophrenia: avolition and Occam's razor. *Schizophrenia Bulletin*, 36(2), 359–369.
- Fuster, J. M., 1999. Synopsis of function and dysfunction of the frontal lobe. *Acta Neurologica Scandinavia*, 99, 51–57.
- Girardi, A., MacPherson, S. E., Abrahams, S. 2011. Deficits in emotional and social cognition in amyotrophic lateral sclerosis. *Neuropsychology*, 25(1), 53.
- Goldstein, L. H., Abrahams, S., 2013. Changes in cognition and behaviour in amyotrophic lateral sclerosis: nature of impairment and implications for assessment. *The Lancet Neurology*, 12(4), 368–380.
- Grace, J., Malloy, P., 2001. *Frontal Systems Behavior Scale (FrSBc): Professional Manual*. Lutz, FL, Psychological Assessment Resources.

- Grace, J., Stout, J. C., Malloy, P. F., 1999. Assessing frontal lobe behavioural syndromes with the Frontal Lobe Personality Scale. *Assessment*, 6, 269–284.
- Grossman, A. B., Woolley-Levine, S., Bradley, W. G., Miller, R. G. 2007. Detecting neurobehavioral changes in amyotrophic lateral sclerosis. *Amyotrophic Lateral Sclerosis*, 8(1), 56-61.
- Habib, M., 2004. Athymhormia and disorders of motivation in basal ganglia disease. *Journal of Neuropsychiatry and Clinical Neuroscience*, 16, 509–525.
- Horn, J. L., 1965. A rationale and test for the number of factors in factor analysis. *Psychometrika*, 30, 179–185.
- Ishizaki, J., Mimura, M., 2011. Dysthymia and apathy: diagnosis and treatment. *Depression research and treatment*, 1–7, doi:10.1155/2011/893905.
- Kay, S. R., Opler, L. A., Lindenmayer, J. P., 1989. The Positive and Negative Syndrome Scale (PANSS): rationale and standardisation. *British Journal of Psychiatry*, 155, 59–67.
- Kirkpatrick, B., Strauss, G. P., Nguyen, L., Fischer, B. A., Daniel, D. G., Cienfuegos, A., Marder, S. R., 2011. The brief negative symptom scale: psychometric properties. *Schizophrenia bulletin*, 37(2), 300-305.
- Kline, P., 1994. *An easy guide to factor analysis*. London: Routledge.
- Kring, A. M., Gur, R. E., Blanchard, J. J., Horan, W. P., Reise, S. P., 2013. The clinical assessment interview for negative symptoms (cains): final development and validation. *American Journal of Psychiatry*, 170(2), 165-172
- Landes, A. M., Sperry, S. D., Strauss, M. E., 2005. Prevalence of apathy, dysphoria, and depression in relation to dementia severity in Alzheimer's disease. *The Journal of Neuropsychiatry and Clinical Neuroscience*, 17, 342–349.

- Levy, R., 2012. Apathy: A pathology of goal-directed behaviour. A new concept of the clinic and pathophysiology of apathy. *Revue neurologique*, 168(8), 585–597.
- Levy, M. L., Cummings, J. L., Fairbanks, L. A., Masterman, D., Miller, B. L., Craig, A. H., Paulsen, J. S., Litvan, I., 1998. Apathy is not depression. *The Journal of Neuropsychiatry and Clinical Neuroscience*, 10, 314–319.
- Levy, R., Czernecki V., 2007. Apathy and the basal ganglia. *Journal of Neurology*, 253, 54–61.
- Levy, R., Dubois, B. 2006. Apathy and the functional anatomy of the prefrontal cortex-basal ganglia circuits. *Cerebral Cortex*, 16, 916–928.
- Marin, R. S., 1990. Differential diagnosis and classification of apathy. *The American Journal of Psychiatry*, 147(1), 22-30.
- Marin, R. S., 1991. Apathy: a neuropsychiatric syndrome. *Journal of Neuropsychiatry and Clinical Neuroscience*, 3, 243–254.
- Marin, R. S., 1996. Apathy: concept, syndrome, neural mechanisms, and treatment. *Seminars in Clinical Neuropsychiatry*, 1, 304–314.
- Marin, R. S., Biedrzycki, R. C., Firinciogullari, S., 1991. Reliability and validity of the Apathy Evaluation Scale. *Psychiatry Research*, 38, 143–162.
- Marin, R. S., Firinciogullari, S., Biedrzycki, R. C., 1994. Group differences in the relationship between apathy and depression. *Journal of Nervous and Mental Disease*, 182, 235–239.
- Mendez, M. F., Lauterbach, E. C., Sampson, S. M., 2008. ANPA Committee on Research. An evidence-based review of the psychopathology of frontotemporal dementia: a report of the ANPA Committee on Research. *The Journal of Neuropsychiatry and Clinical Neuroscience*, 20, 130–149.

- McClintock, S. M., Husain, M. M., Greer, T. L., Cullum, C. M., 2010. Association between depression severity and neurocognitive function in major depressive disorder: A review and synthesis. *Neuropsychology*, 24, 9–34.
- Norris, G., Tate, R. L., 2000. The behavioural assessment of the dysexecutive syndrome (BADS): ecological, concurrent and construct validity. *Neuropsychological Rehabilitation*, 10, 33–45.
- Overall, J. E., Gorham, D. R., 1962. The Brief Psychiatric Rating Scale. *Psychological Reports*, 10, 790–812.
- Pluck, G. C., Brown, R. G., 2002. Apathy in Parkinson's disease. *Journal of Neurology, Neurosurgery and Psychiatry*, 73, 636–642.
- Pedersen, K. F., Larsen, J. P., Alves, G., Aarsland, D., 2009. Prevalence and clinical correlates of apathy in Parkinson's disease: a community-based study. *Parkinsonism & Related Disorders*, 15, 295–299.
- Robert, P. H., Clairet, S., Benoit, M., Koutaich, J., Bertogliati, C., Tible, O., Caci, H., Borg, M., Brocker, P., Bedoucha, P., 2002. The Apathy Inventory: assessment of apathy and awareness in Alzheimer's disease, Parkinson's disease and mild cognitive impairment. *International Journal of Geriatric Psychiatry*, 17, 1099–1105.
- Robert, P. H., Onyike, C. U., Leentjens, A. G. F., Dujardin K., Aalten, P., Starkstein, S., Verhey, F. R. J., Yessavage, J., Clement, J. P., Drapier, D., Bayle, F., Benoit, M., Boyer, P., Lorca, P. M., Thibaut, F., Gauthier, S., Grossberg, G., Vellas, B., Byrne, J., 2009. Proposed diagnostic criteria for apathy in Alzheimer's disease and other neuropsychiatric disorders. *European Psychiatry*, 24, 98–104.
- Sockeel, P., Dujardin, K., Devos, D., Deneve, C., Destee, A., Defebvre, L., 2006. The Lille Apathy Rating Scale (LARS), a new instrument for detecting and quantifying apathy:

- validation in Parkinson's disease. *Journal of Neurology, Neurosurgery and Psychiatry*, 77, 579–584.
- Starkstein, S. E., Leentjens, A. F. 2008. The nosological position of apathy in clinical practice. *Journal of Neurology, Neurosurgery & Psychiatry*, 79(10), 1088-1092.
- Strauss, M. E., Sperry, S. D., 2002. An informant-based assessment of apathy in Alzheimer disease. *Neuropsychiatry, Neuropsychology, & Behavioral Neurology*, 15, 176–183.
- Stuss D. T., 2011. Functions of the frontal lobes: relation to executive functions. *Journal of the International Neuropsychological Society*, 17, 759–765.
- Tagariello, P., Girardi, P., Amore, M., 2009. Depression and apathy in dementia: same syndrome or different constructs? A critical review. *Archives of gerontology and geriatrics*, 49(2), 246–249.
- Turner, N. E., 1998. The effect of common variance and structure pattern on random data eigenvalues: Implications for the accuracy of parallel analysis. *Educational and Psychological Measurement*, 58, 541–568.
- Woolley, S. C., Zhang, Y., Schuff, N., Weiner, M. W., Katz, J. S., 2011. Neuroanatomical correlates of apathy in ALS using 4 Tesla diffusion tensor MRI. *Amyotrophic Lateral Sclerosis*, 12, 52–58.
- van Reekum, R., Stuss, D. T., Ostrander, L., 2005. Apathy: why care? *The Journal of Neuropsychiatry and Clinical Neuroscience*, 17, 7–19.
- Varanese, S., Perfetti, B., Ghilardi, M. F., Di Rocco, A. 2011. Apathy, but not depression, reflects inefficient cognitive strategies in Parkinson's disease. *PLoS One*, 6(3), e17846.

Developing a new apathy measurement scale: dimensional apathy scale

Ratko Radakovic and Sharon Abrahams

This material supplements but does not replace the content of the peer-reviewed paper published in *Psychiatry Research*.

45-item scale

| Item Code | Item |
|-----------|---|
| A1 | I find it hard to concentrate on things |
| A2 | I am affectionate to those I care about |
| A3 | I have difficulty thinking of things to do |
| A4 | I need a bit of encouragement to get things started |
| A5 | I am not interested in other people's news |
| A6 | I feel emotionally flat |
| A7 | I contact my friends |
| A8 | I become emotional easily when watching something happy or sad on TV |
| A9 | I am unconcerned about how others feel about my behaviour |
| A10 | I lack motivation |
| A11 | After having done something, I spend time thinking whether it was good or bad |
| A12 | I find myself staring in to space |
| A13 | Before I do something I think about how others would feel about it |
| A14 | I plan my days activities in advance |
| A15 | I struggle to empathise with other people |
| A16 | I express/ show my emotions |
| A17 | I try new things |
| A18 | I am easily distracted |
| A19 | When faced with several options, I arrive to a decision easily |
| A20 | When criticized I feel the need to defend myself |
| A21 | I am a good problem solver |
| A22 | I sit and think of nothing for most of the day |
| A23 | I set goals for myself |
| A24 | I act on things I have thought about during the day |
| A25 | I am organized |
| A26 | I need to be prompted to perform everyday tasks |
| A27 | When doing a demanding task, I have difficulty working out what I have to do |
| A28 | I keep myself busy |
| A29 | I get easily confused when doing several things at once |
| A30 | My mind tends to go blank |
| A31 | I struggle to keep track of conversation |
| A32 | I think of new things to do during the day |
| A33 | I find it difficult to keep my mind on things |
| A34 | I am concerned about how my family feel |
| A35 | I am able to focus on a task until it is finished |
| A36 | I feel indifferent to what is going on around me |
| A37 | When I want to do something I can make an effort |
| A38 | I am uninterested in what others have to say |
| A39 | If I think I will forget something, I make an effort to remember it |
| A40 | I am spontaneous |
| A41 | When I make a mistake, I try and correct |
| A42 | When I can, I start conversations |
| A43 | I am not concerned about failing or succeeding |
| A44 | When I receive bad news I feel bad about it |

DAS**Dimensional Apathy Scale**

PN:

Name..... Age..... Sex.....

Marital Status..... Years of Education.....

Choose the answer on how you have **felt, behaved or thought**, based on the rate of occurrence in the last month: (Circle the statement that applies)

- | | |
|---|--|
| <p>1. I need a bit of encouragement to get things started</p> <ul style="list-style-type: none"> ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever | <p>* 7. Before I do something I think about how others would feel about it</p> <ul style="list-style-type: none"> ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever |
| <p>* 2. I contact my friends</p> <ul style="list-style-type: none"> ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever | <p>* 8. I plan my days activities in advance</p> <ul style="list-style-type: none"> ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever |
| <p>* 3. I express my emotions</p> <ul style="list-style-type: none"> ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever | <p>* 9. When I receive bad news I feel bad about it</p> <ul style="list-style-type: none"> ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever |
| <p>* 4. I think of new things to do during the day</p> <ul style="list-style-type: none"> ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever | <p>* 10. I am able to focus on a task until it is finished</p> <ul style="list-style-type: none"> ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever |
| <p>* 5. I am concerned about how my family feel</p> <ul style="list-style-type: none"> ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever | <p>11. I lack motivation</p> <ul style="list-style-type: none"> ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever |
| <p>6. I find myself staring in to space</p> <ul style="list-style-type: none"> ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever | <p>12. I struggle to empathise with other people</p> <ul style="list-style-type: none"> ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever |

DAS**Dimensional Apathy Scale**

PN:

- | | |
|---|---|
| <p>* 13. I set goals for myself ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever</p> <p>* 14. I try new things ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever</p> <p>15. I am unconcerned about how others feel about my behaviour ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever</p> <p>* 16. I act on things I have thought about during the day ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever</p> <p>17. When doing a demanding task, I have difficulty working out what I have to do ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever</p> <p>* 18. I keep myself busy ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever</p> | <p>19. I get easily confused when doing several things at once ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever</p> <p>* 20. I become emotional easily when watching something happy or sad on TV ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever</p> <p>21. I find it difficult to keep my mind on things ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever</p> <p>* 22. I am spontaneous ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever</p> <p>23. I am easily distracted ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever</p> <p>24. I feel indifferent to what is going on around me ◇ Almost always ◇ Often ◇ Occasionally ◇ Hardly Ever</p> |
|---|---|

Note. Positive scored items *

SELF- DAS (DIMENSIONAL APATHY SCALE)

Scoring Instructions

Using the scoring instructions below, sum the total scores for each subscale.

Scoring Instructions

| Positive Item Scoring + | | Negative Item Scoring | |
|-------------------------|----------|-----------------------|----------|
| ◇ Almost always | 0 | ◇ Almost always | 3 |
| ◇ Often | 1 | ◇ Often | 2 |
| ◇ Occasionally | 2 | ◇ Occasionally | 1 |
| ◇ Hardly Ever | 3 | ◇ Hardly Ever | 0 |

Scoring Sheet

| Executive Subscale | Emotional Subscale | Behaviour/Cognitive Initiation Subscale | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--------------------|---|---|--|---|--|-----|--|----|--|----|--|----|--|----|--|----|--|--|------|-------|----|--|----|--|----|--|----|--|----|--|----|--|-----|--|----|--|--|------|-------|----|--|----|--|----|--|-----|--|-----|--|-----|--|-----|--|-----|--|
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