Movement Disorders
Vol. 23, No. 14, 2008, pp. 2015–2025

Anxiety Rating Scales in Parkinson's Disease: Critique and Recommendations

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Abstract: Anxiety syndromes are common in patients with Parkinson's disease (PD) with up to 30% suffering from panic disorder, and up to 11% from generalized anxiety disorder (GAD). Anxiety is associated with increased subjective motor symptoms, more severe gait problems, dyskinesias, freezing, and on/off fluctuations. Anxiety has a negative impact on health related quality of life and is strongly associated with depressive syndromes. Since a variety of anxiety scales have been used in PD patients, the Movement Disorder Society commissioned a task force to assess the clinimetric properties of these scales in PD. A systematic review was conducted to identify anxiety scales that have either been validated or used in patients with PD. Six anxiety rating scales were identified. These were the Beck anxiety inventory, the hospital anxiety and depression scale, the Zung self-rating anxiety scale and anxiety status inventory, the Spielberger state trait anxiety inventory, and the Hamilton anxiety rating scale. In addition, Item 5 (anxiety) of the neuropsychiatric inventory was included in the review. No scales met the criteria to be "recommended," and all scales were classified as "suggested." Essential clinimetric information is missing for all scales. Because several scales exist and have been used in PD, the task force recommends further studies of these instruments. If these studies show that the clinimetric properties of existing scales are inadequate, development of a new scale to assess anxiety in PD should be considered. © 2008 Movement Disorder Society

Key words: anxiety; depression; Parkinson's disease; clinimetrics; psychometrics; rating scales; validity; reliability

Additional Supporting Information may be found in the online version of this article.

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Potential conflict of interest: None reported.

Received 11 February 2008; Revised 4 June 2008; Accepted 21 June 2008

Published online 12 September 2008 in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/mds.22233

Anxiety disorders and anxiety symptoms are frequent in Parkinson's disease (PD). The actual prevalence rates are uncertain as anxiety in PD has not been studied extensively. However, estimates suggest that up to 40% of PD patients experience substantial anxiety.[1] In another study, 29% of PD patients had a DSM-III-R anxiety disorder, but 40% had significant anxiety symptoms in the absence of a formal diagnosis of an anxiety disorder.[2] Panic disorder[†] is the most frequent anxiety disorder in PD with a reported prevalence rates varying from 13 to 30%.[3–6] However, PD patients experiencing panic attacks or other forms of episodic anxiety may not always fulfill the diagnostic criteria for panic disorder. One study showed that panic attacks were present in 14.3% of patients, whereas only 3.6% suffered from DSM-IV panic disorder.[4] Generalized anxiety disorder (GAD) has been reported in up to 11% of PD patients.[3–5] One single study reported a prevalence of social phobia (or social anxiety disorder) of 15% in a small sample of PD patients, but no other studies on social phobia were identified.[5] Although obsessive and compulsive symptoms and behaviors are reported in PD, the prevalence of obsessive-compulsive disorder is not significantly higher in PD than in control populations.[3,7,8] No prevalence rates for specific phobia, post-traumatic stress disorder or acute stress disorder were found for PD patients.

Anxiety in PD is associated with increased subjective motor symptoms,[9] more severe gait problems and dyskinesias,[10] as well as with freezing[4] and on/off fluctuations.[9,11] Anxiety symptoms in PD patients have also been shown to have a negative impact on health-related quality of life.[12,13]

Anxiety, as well as depressed mood, have also been described as part of the symptomatology of "non-motor off" periods,[14] or as a short levodopa abstinence syndrome.[10] Non-motor fluctuations are commonly associated with motor fluctuations and reported in up to 75% of patients with such motor fluctuations.[15] Depression and anxiety symptoms, including panic symptoms, are often part of the "off" state with instant relief when patients turn "on."[14,16] Because these fluctuating anxiety episodes that are variably related to motor functioning and antiparkinsonian medications do not fulfill criteria for any of the specific DSM IV anxiety disorders, they are currently best captured under the diagnosis of anxiety disorder "not otherwise specified" when they are clinically significant. Finally, physical symptoms of PD can overlap with symptoms of anxiety disorders. Most notable are autonomic symptoms, although fatigue, cognitive difficulties, and sleep disturbances also occur in both conditions.

Since many scales for the assessment of anxiety exist, but their usefulness in patients with PD is unknown, the Movement Disorder Society (MDS) organized a task force to review the clinimetric properties of these scales.

PATIENTS AND METHODS

Administrative Organization and Critique Process

The steering committee of the MDS task force on rating scales for PD invited the chairman (AL) to form a task force to critique existing anxiety rating scales for their use in PD and to place them in a clinical and clinimetric context. This task force consisted of the same members and followed the same working methods as the task force on apathy rating scales.[17] The task force members selected the scales to be included in the review and identified unresolved issues and limitations of the scales used. The *proforma* that was previously used to assess depression rating scales was adapted for reviewing anxiety rating scales.[17] This proforma allowed structured assessment of the scales with regard to their descriptive properties, availability, content, use, acceptability, clinimetric properties and overall impression in patients with and without PD (see online version of this article). Each scale was reviewed by two task force members, one acting as the lead. The completed reviews were then assessed by all other members of the task force and modified according to their suggestions. In a final appraisal of a scale, the task force used the terminology as used by the MDS in the development of the Appendix of ancillary scales to complement the MDS-sponsored revision of the UPDRS (MDS-UPDRS).[18] These criteria were also used in a recent review of scales to assess psychosis in PD, and are summarized in Table 1.[19]

The results of the reviews, identified problems and conclusions were summarized by the chairman, and the draft report revised following feedback and discussion with all task force members. The report was reviewed and altered according to suggestions by the members of the Steering Committee and submitted and approved by the Scientific Issues Committee of the MDS before submission to *Movement Disorders*.

[†]"Panic Disorder" is generally abbreviated as "PD." In order to avoid confusion with Parkinson's disease (PD), "panic disorder" will be spelled in full throughout the document.

TABLE 1. *Overview of classification system of rating scales on the basis of their properties, as used by the MDS in the development of the appendix of ancillary scales to complement the MDS-sponsored revision of the UPDRS (MDS-UPDRS)*

	Criteria			
Classification	Used in PD	Used in PD beyond original developers	Successful clinimetric testing	Total number of required criteria
Recommended	X	X	X	3
Suggested	X			2
Listed	X	0	0	1

X, required criterion; O, criterion should not be met.

Selection of Scales

All scales that have been designed to assess anxiety and that have been either validated or used in studies with PD patients, were included in the review. These scales were identified by way of a literature search. Multidimensional scales that are used to screen more broadly for psychiatric symptoms and which may include items referring to anxiety were considered beyond the scope of this project, even though some of these scales have been used in studies addressing anxiety in PD. An exception was made for the anxiety subscale of the neuropsychiatric inventory (NPI), because of the frequency with which this instrument is used to assess psychiatric symptoms in PD. Although obsessive-compulsive disorder is considered as an anxiety disorder in the DSM classification (but not in the ICD classification), scales assessing obsessive-compulsive symptoms were not considered here. This was because obsessive-compulsive symptoms in PD are often viewed as phenomenologically different from anxiety and are often associated with a spectrum of other behaviors that also include punding, repetitive behaviors, and hypersexuality.[20–22]

Literature Search Strategy

Medline on PubMed was searched for relevant papers with the terms "Parkinson's disease," "parkinsonism" or "Parkinson disease," and "anxiety" published until February 2007. For each scale, a search was conducted for the terms "Parkinson's disease" (or "parkinsonism" or "Parkinson disease") and the name of the scale. Only published or *in press* peer-reviewed papers or abstracts known to the task force members were included in this review.

RESULTS

Identified Scales and Their Utilization in Clinical Practice and Research

Six anxiety rating scales that have either been validated or used in PD were identified. These were the Beck anxiety inventory (BAI),[23] the hospital anxiety and depression scale (HADS),[24] the Zung self-rating anxiety scale (SAS), and anxiety status inventory (ASI),[25] the Spielberger state trait anxiety inventory (STAI),[26] and the Hamilton anxiety rating scale (HARS).[27] In addition, Item 5 (anxiety) of the NPI was also included in the review.[28]

Identified Confounds Associated With Anxiety Rating Scales

Overlap of Anxiety and Depressive Symptoms

All anxiety scales include items that may also reflect depression. For instance, the HARS includes an item "depressed mood," as well as the items "tension," "insomnia," "difficulties concentrating," and "general somatic symptoms" (which also includes fatigability),[27] all of which are also listed as DSM criteria for major depressive disorder.[29] The effect of comorbid depressive symptoms on anxiety ratings is largely unknown, but some studies indicate that this may be substantial. In a study by Menza et al., 44% of the variance of scores on the Zung SAS was explained by the score on the geriatric depression scale.[2] Also, for the HADS it was shown that the anxiety subscale discriminated better between depressed and non-depressed PD patients than the depression subscale.[30]

Overlap of Anxiety With Motor and Other Symptoms in PD

While the essential feature of an anxiety disorder is the presence of an inappropriate degree of apprehension, fear, or worry, anxiety disturbances are also associated with other subjective mood changes and a range of somatic, cognitive, and behavioral changes, which may or may not be apparent to others. It is also important to distinguish anxiety that is experienced in an appropriate context and degree from pathological conditions in which the anxiety is manifest or experienced as inappropriate, excessive and disproportionate to the circumstances. Commonly, behavioral changes associated with anxiety can mimic physical symptoms of PD. For instance, agitation may be mistaken for tremor, and restlessness for dyskinesia. In addition, motor symptoms may increase when patients feel

nervous or anxious. Conversely, a number of motor and non-motor symptoms associated with PD can be features of an anxiety disturbance. For example, muscle tension, fatigue, concentration deficits, and sleep difficulties are all included among the associated criteria for the DSM diagnosis of GAD. Akathisia, palpitations, hyperhidrosis, and other autonomic phenomena that occur in panic attacks can also occur episodically in PD and lead to the misdiagnosis of a panic disorder.[31] Thus, in patients with known anxiety disturbances, in the absence of information on the time course and development of different motor and non-motor symptoms, it can be impossible to attribute the presence of some phenomena to an anxiety disorder versus underlying PD.

The Limitations of Diagnostic Criteria for Various Anxiety Disorders in Patients With PD

As discussed earlier, some episodic anxiety disturbances are unique to PD and are prone to an interplay with other aspects of PD, such as mobility. Rating scales may not always capture the symptoms that reflect the phenomenology of these atypical anxiety syndromes.

Heterogeneity of Anxiety Disturbances in PD

An issue that is not unique to PD but confounds approaches to symptom ratings is that some anxiety disorders involve persistent symptoms of anxiety, such as GAD and post-traumatic stress disorder, whereas others are episodic or situational, such as specific or social phobias, panic attacks, and anxiety related to "off"-states. It can be difficult, in the absence of instructions, to use the same scale to rate anxiety symptoms that are episodic versus persistent. In addition, most anxiety scales were developed to rate the severity of anxiety symptoms in patients diagnosed with anxiety disorders. However, in the PD literature, anxiety-rating scales have generally not been applied to restricted subgroups of patients with a uniform type. Rather, the most common uses are as indices of the severity of anxiety symptoms in unselected groups with PD or to support the validity of anxiety disorder diagnoses relative to an unaffected group.

Critique of Anxiety Scales

A summary review of each identified scale is provided here. Although statements and conclusions are referenced in the text, the reader is referred to the full reviews of the scales for more specific clinimetric details and more extensive referencing. These reviews are available in the online version of this article. An overview of the final assessments of all scales is given in Table 2.

TABLE 2. *Overview of the scales assessed and their classification*

Scale	Applied in PD	Applied beyond original authors	Successful clinimetric testing	Qualification
BAI	X	X	0	suggested
HADS	X	X	0	suggested
Zung SAS	X	X	0	suggested
Zung ASI	X	X	0	suggested
STAI	X	X	0	suggested
HARS	X	X	0	suggested
NPI anxiety	X	X	0	suggested

For an explanation of the qualification groups: see text.

BAI, Beck Anxiety Inventory; HADS, Hospital Anxiety and Depression Scale; SAS, Self-rating Anxiety Scale; ASI, Anxiety Status Inventory; STAI, Stait Trait Anxiety Inventory; HARS, Hamilton Anxiety Rating Scale.

The Beck Anxiety Inventory[23]

Description of the Scale

Similar to the Beck Depression Inventory, the BAI is a self report questionnaire that consists of 21 items meant to measure the severity of somatic, affective, and cognitive symptoms associated with panic attacks and generalized anxiety in a psychiatric population.[23] Each item is formulated as a four-point Likert item, ranging from 0 to 3, that scores severity and/or frequency of a certain symptom, with higher scores indicating more severe anxiety symptoms. The scale was developed to consolidate three other anxiety inventories for use in psychiatric populations and to have a scale that would reliably discriminate anxiety from depression when displaying convergent validity.

Anxiety in Non-PD Patients

The BAI has good face validity for symptoms of panic attacks, as it queries for 10 of the 13 symptoms listed in the DSM classification. It has more limited face validity for GAD, as it does not include worrying and other DSM-IV symptoms of GAD. This is also reflected in criterion validity. The BAI has good criterion validity for panic disorder, but not for GAD or other anxiety disorders.[32] It has good internal consistency and test-retest reliability, but moderate item-total correlations.[23] It has proven to be sensitive to change

during both pharmacological and psychotherapeutic treatment.[33,34]

Anxiety in PD Patients

The BAI has not been validated in PD. However, it has proven its usefulness in a number of studies of the epidemiology and markers of anxiety in PD patients.[35,36] Sensitivity to change has not been studied specifically in PD, but the BAI has shown to be sensitive to change during treatment targeting motor symptoms with a form of massage therapy called neuromuscular therapy, and deep brain stimulation.[37]

Final Assessment

The BAI fulfils the criteria for "suggested" scale to screen for symptoms of panic attacks in PD patients. It is probably less suitable to screen for other anxiety disorders. It also fulfils the criteria for "suggested" scale to study the epidemiology and markers of anxiety symptoms, and for monitoring changes in symptom severity as a result of treatment.

The Hospital Anxiety and Depression Scale[24]

Description of the Scale

The (HADS) is a 14-item self report scale that consists of a depression and an anxiety subscale, each consisting of seven statements.[24] The patient has to score the extent to which he agrees with each statement on a four-point scale ranging from 0 to 3. Some items are reversely scored. The depression subscale is focused on anhedonia (5 of the 7 items) as the central psychopathological feature of depression. The anxiety subscale contains three items that refer to panic and four to generalized anxiety. The HADS is an instrument designed for screening of mood disorders in general (non-psychiatric) medical outpatients and aims at distinguishing depression from anxiety. It is stated that somatic and cognitive symptoms are not included in the scale, but some statements could still be construed as somatic, such as Item 1 "feeling tense" and Item 8 "feeling slowed down." This review is limited to the properties of the HADS in relation to anxiety; its relation to depressive syndromes is reviewed elsewhere.[17]

Anxiety in Non-PD Patients

The task force is of the opinion that face validity of the anxiety subscale is moderate since statements do not readily reflect defined anxiety symptoms or diagnostic criteria, and the formulations are sometimes susceptible to various interpretations. Moreover, some statements seem to be closely related to others (e.g. Items 1 "feeling tense," 7 "feel relaxed" and 11 "restless," and Items 3 "sort of frightened feeling" and 9 "frightened feeling in stomach"). In spite of this limited face validity, internal consistency, and test-retest reliability are satisfactory.[38] In studies assessing the concurrent validity with DSM IV criteria for anxiety disorders, the sensitivity and specificity for "any anxiety disorder" is good, as are those for GAD, panic disorder and social phobia.[39,40] There are fair correlations with other anxiety measures, such as the BAI and the STAI.[39]

Anxiety in PD Patients

Internal consistency and test-retest reliability are satisfactory in PD patients.[13] No information on criterion validity or concurrent validity with other anxiety scales is available. There is a fair to moderate correlation of the HADS with several quality-of-life measures. The anxiety subscale of the HADS is not able to discriminate between anxiety and depression in PD patients.[30] There are no known published treatment studies of anxiety disorders in PD that have used the HADS as an outcome measure, but two studies involving patients undergoing pallidotomy and subthalamic deep brain stimulation have reported changes in HADS-anxiety scores after treatment.

Final Assessment

The HADS fulfils the criteria for "suggested" scale to screen for anxiety in PD patients. Only limited clinimetric information is available, and notably no information on criterion validity. Limited information is available on the ability of the HADS to measure sensitivity of change during treatment. Because of the choice and formulation of its statements, it is not recommended to study the phenomenology of anxiety disorders in PD.

Zung Self-Rated Anxiety Scale and Anxiety Status Inventory[25]

Description of the Scales

The self-rated anxiety scale (SAS) and anxiety status inventory (ASI) are self-rated and observer-rated versions of the same scale. Both were developed together and evaluated in the original publication.[25] Each scale consists of 20 items. The ASI is a four-point scale

(rated 1–4) in which severity is assessed based on the combination of intensity, frequency, and duration of symptoms. The SAS is based on the same 20 items as the ASI, and scored on the same four-point scale. Some of the items are reversely scored. An index for both scales is derived by dividing the sum of the values (raw scores) obtained on the 20 items by the maximum possible score of 80, converted to a decimal and multiplied by 100. To prevent confusion between the ASI and SAS results, the converted ASI score is called a *Z*-score and the converted SAS score is called an index. Symptoms relate mostly to GAD and panic disorder. The original aim of the scales was to fulfill the need for a standardized method of evaluating and recording the presence of anxiety as a clinical disorder.

Anxiety in Non-PD Patients

The observer-rated ASI has good internal consistency when used in older adults[41] and with good item-total correlations. Several studies have shown that the internal consistency of the SAS in non-psychiatric and psychiatric samples is adequate with good item-total correlations and a good test–retest reliability.[42–44] The correlation between the two scales was fair. No studies have been performed in relation to diagnostic criteria for anxiety disorders for either the SAS or the ASI. The correlation with the Taylor manifest anxiety scale was low.[25] In non-PD patients the SAS has shown to be sensitive to change in treatment studies of anxiety.

Anxiety in PD Patients

Although the SAS has been used in a number of epidemiological studies of anxiety in PD,[1,2,11,45] it has not been validated in this population. The ASI was used in one study.[5] Neither scale has been used in treatment studies involving PD patients.

Final Assessment

The Zung SAS and ASI fulfill the criteria for "suggested" scale. No information on its clinimetric properties in PD patients is available.

The Spielberger State Trait Anxiety Inventory[46]

Description of the Scale

The state-trait anxiety inventory (STAI) was first developed in the 1960s[26] and later revised in 1983.[46] The original STAI is usually called the STAI-X, and the revised STAI is usually referred to as the STAI-Y. Although the two versions are highly correlated, several items were changed and scores on the "Y-version" are said to have a more replicable factor structure and improved psychometric properties.[47] Both instruments are commonly used and copyrighted for both clinical and research use.

The STAI is a self-report questionnaire that evaluates feelings of apprehension, tension, nervousness, and worry. There are two scales, designed to differentiate between the temporary condition of "state anxiety" and the more general and long-standing quality of "trait anxiety." The time frame for the "state" questionnaire is "right now," which may yield problems when assessing patients with panic disorder outside the context of a panic attack. The time frame for the "trait" questionnaire is not defined. Each scale has 20 statements that are scored as a four-point Likert items, ranging from 1 ("not at all") to 4 ("very much so") for the state scale (reflecting intensity), and 1 ("almost never") to 4 ("almost always") for the trait scale (reflecting frequency). Even though the total number of items is higher than that of other anxiety scales, some symptoms of GAD, panic disorder, social phobia, and other anxiety disorders, such as fatigue, concentration, irritability, and sleep disturbances, are not represented in the "state" scale. Although this is in one way an omission, it also means that overlap with symptoms associated with PD is minimal.

Anxiety in Non-PD Patients

For both versions (X and Y) the internal consistency is good.[26,46] Also for both versions, the test–retest reliability is satisfactory for the "trait" questionnaire, but low for the "state" questionnaire.[26,46] In a study assessing criterion validity using the SCID as gold standard, the STAI-Y trait scale did not provide high sensitivity and specificity at any cut-off point, and was deemed to be less accurate than the BAI.[48] Concurrent validity with the Taylor manifest anxiety scale, the institute of personality and ability testing anxiety scale, and the multiple affect adjective check list was moderate to good.[46] In one study, the STAI-Y trait scale score was more highly correlated with the Beck depression inventory than with the BAI. The STAI has been used in numerous studies and has proven to be sensitive to change.

Anxiety in PD Patients

No validation studies for PD patients are available. A fair number of studies have used the STAI in PD popu-

lations to screen for anxiety symptoms, assess their severity, to study biological markers of anxiety, and changes in severity of anxiety symptoms during motor treatment with deep brain stimulation. In a study examining the association between anxiety symptoms and motor fluctuations in PD, STAI-X state scores were higher during "off" periods than "on" periods.[9] In a study of PD patients who underwent neuroimaging to determine the association between depression and dopamine/norepinephrine transporter binding availability in PD, the STAI-X trait score was higher in depressed then in non-depressed subjects.[49] In another study examining the relationship between event-related potentials (P300) and activities in PD patients, there were no differences between subjects with and without prolonged P300 latency on STAI-X state or trait scale scores.[50]

There have been a series of manuscripts using the same study population of PD patients undergoing deep brain stimulation of the subthalamic nucleus that has used the STAI-X state questionnaire as a measure for anxiety.[51–54] The most recent publication reports on the use of the STAI in the largest sample of patients (N = 72). This study reported no changes in mean STAI state or trait scale scores. However, at an individual level, 12% of patients experienced an increase in anxiety and 23% a decrease in anxiety.[52]

In a study of PD patients and healthy spouse controls, PD patients and controls had similar mean scores on the trait scale, but PD patients had significantly higher state scale scores.[11]

Final Assessment

The STAI fulfils the criteria for "suggested" scale. Although the STAI is extensively validated for healthy persons, no validation studies in PD populations are available. On the basis of studies that have used the STAI in PD patients, it may be suitable to screen for anxiety, to study biological markers, and as an outcome measure. Although brief and easy to administer, the STAI does not cover all symptoms of GAD and panic disorder, which are the most common anxiety disorders in PD.

Hamilton Anxiety Rating Scale[27]

Description of the Scale

The Hamilton anxiety rating scale (HARS) was designed as a clinician-rated instrument to assess and quantify severity of anxiety symptoms in patients diagnosed with "neurotic anxiety states."[27] The scale was not intended for measurement of anxiety in the context of other psychiatric or medical conditions, as it is currently used. There are multiple versions of the HARS, but most studies use the 14-item version that consists of 13 questions and one observational rating of the patient's behavior during the interview. Each item is rated on a five-point Likert-type scale ranging 0 to 4, with higher scores indicating more severe anxiety.

Anxiety in Non-PD Patients

Face validity is good, although the scale is weighted towards the somatic symptoms of anxiety. Latent structure analysis showed an insufficient Rasch model, and homogeneity is poor.[55,56] In spite of these deficiencies, internal consistency is good, as are inter-rater reliability and test–retest reliability.[57,58] The scale is sensitive to change and is, in fact, one of the most frequently used anxiety scales in clinical trials.

Anxiety in PD Patients

The scale has not been validated in PD patients. It has been used, however, in several studies related to the epidemiology and symptomatology of anxiety in this population.[3,10,31] One study used the HARS as an outcome measure in a study evaluating the treatment of motor symptoms with testosterone.[59]

Final Assessment

The HARS fulfils the criteria for "suggested" scale. No information on its clinimetric properties in PD patients is available.

The Neuropsychiatric Inventory-Anxiety Subscale[28]

Description of the Scale

The (NPI) is clinician-rated instrument, based on a structured interview with an informant who is familiar with the patient's behavior, usually the subject's caregiver.[28] The NPI assesses 12 neuropsychiatric disturbances that occur in dementia: delusions, hallucinations, agitation/aggression, depression, anxiety, euphoria/elation, apathy/indifference, disinhibition, irritability/lability, aberrant motor behavior, sleep disturbances, and appetite disturbances. Item E addresses anxiety. An initial screening probe, consisting of three questions asks about the presence or absence of anxiety symptoms. When any one of the screening questions is answered affirmatively, an additional seven questions address more specific features about behaviors associated with anxiety. Both frequency and severity of the

symptoms are rated: frequency on a four-item scale; severity on a three-item scale. The frequency and severity scores are multiplied to give the total subscale score, although this yields a nonlinear scoring metric in which it is it is not possible to have scores of 5, 7, 10 or 11. Since the NPI was developed for assessment of behavior in patients with already diagnosed dementia, cognitive symptoms are not assessed. Hence, the anxiety section focuses on behavioral manifestations of the emotional and somatic symptoms of anxiety.

Anxiety in Non-PD Patients

The original publication shows that the internal consistency of the anxiety subsection on the NPI is good. Also, inter-rater agreement for the anxiety item was high for both frequency and severity. Test–retest correlations were moderate for frequency, but only fair for severity of anxiety.[28] Criterion validity of the NPI anxiety item has not been assessed. There are fair correlations of the NPI anxiety item with the anxiety and phobia scores on the BEHAVE-AD scale.[28] In studies involving Alzheimer patients, the NPI anxiety item has proven to be sensitive to change during treatment with cognitive enhancing drugs in Alzheimer's disease.[60,61]

Anxiety in PD Patients

The validity of the NPI anxiety item in PD patients has not been assessed adequately. In PD patients a sample involving only 12 patients showed a good intraclass correlation coefficient.[62] No other information on reliability is available. Several studies, however, have used the full NPI to investigate the profile of neuropsychiatric disturbances in patients with PD with or without dementia as well as to assess specific clinical correlates associated with scores on the anxiety item.[64–67]

Two studies have used the NPI, including the anxiety item, as an outcome measure in treatment studies of dementia associated with PD with rivastigmine. One study does not mention the effects on the NPI, while the other reported no change.[68,69]

Final Assessment

The NPI anxiety item fulfills the criteria for "suggested" scale. Only one small study involving 12 patients reports on its reliability in PD patients; no other information on its clinimetric properties in PD patients is available. Given the frequency with which the full NPI is used in neuropsychiatric studies, the utility of the NPI-anxiety item alone as a screening, inclusion, or outcome measure in PD patients with or without dementia needs further assessment. The item is probably more suitable for identifying patients with persistent than with episodic anxiety. This is because the screening probe focuses on anxiousness that occurs "for no apparent reason" and the item may not be endorsed when anxiety, even if excessive, has a precipitant. On the basis of evidence coming from studies involving patients with AD, the scale may be especially useful as a screening instrument to identify patients with anxiety, and as an estimate of the severity of anxiety in PD with dementia.

CONCLUSIONS AND RECOMMENDATIONS

At present, none of the reviewed anxiety scales can be recommended for use in PD populations. Basic information on clinimetric properties is missing for all scales. The HADS anxiety section demonstrates reliability, but criterion validity has not been tested. For the HADS, validation studies have focused more on clinimetric properties with respect to depression, than with respect to anxiety. Because of this lack of evidence, the task force cannot categorize this scale as "recommended." Apart from the HADS, scales that have been used most often in research into anxiety in PD are the BAI, HARS, the (anxiety item of the) NPI, and the STAI. All available anxiety scales tend to focus on symptoms of GAD and panic disorder, and not on other anxiety disorders. However, since these are the most prevalent anxiety syndromes in PD, this not a major limitation. On the basis of the item formulation, time frame, and clinimetric information (if available), the BAI is more sensitive to episodic anxiety disorders, such as panic disorder, whereas the STAI is more focused towards sustained anxiety disorders, such as GAD. Since the time frame of the STAI state questionnaire is "right now" it may be assumed that it is not sensitive at all for panic disorder. Other scales have items that are less differentially focused towards either episodic or sustained anxiety disorders. A basic clinimetric question that is not limited to PD and remains unanswered is whether one single scale can be reliable and valid for both episodic and sustained anxiety disorders.

The number of available scales underscores the need for their careful clinimetric testing before considerations of new scale development are entertained. The clinical anxiety scale is presently used in an large ongoing trial in PD patients (the SAD-PD trial; http://www.clinicaltrials.gov) and may also merit further investigation. A review of this scale is also provided in

the supplementary material, available in the online version of this article.

Some symptoms of anxiety disorders overlap with parkinsonian features, such as nervous tremor with parkinsonian tremor, tension and muscle aches with rigidity, and fatigability, which may be a symptom in both conditions. Theoretically it may be expected that this overlap of symptoms may influence clinimetric properties of the scale, with a negative effect on sensitivity or specificity. For depression rating scales it is known that scales with many physical symptoms, such as the Hamilton depression rating scale, need not perform worse, and may sometimes even have better clinimetric properties, than scales without physical items, such as the HADS.[17] For anxiety scales, no information on this issue is available. Hence the task force cannot formulate any recommendation, and more specifically the task force cannot substantiate a preference for scales with less overlapping motor and anxiety items. In addition, the clinimetric properties of anxiety scales may be expected to depend on the way this symptom overlap is approached. For the same reasons as in the rating of depressive symptoms, the task force advises using an "inclusive" approach when rating overlapping symptoms, which means that all symptoms should be rated as they are observed or reported[17] rather than attempting to attribute symptoms to either anxiety or PD. When using self-rated instruments, patients should be explicitly instructed not to interpret symptoms as due to PD or to anxiety, but to just report them as they are experienced.

Patients with motor fluctuations may perceive their own condition differently in an "off" versus an "on" state. "Off" periods may be associated with certain psychiatric symptoms, including depression and anxiety, whereas "on" periods may involve less severe, different, or a lack of psychiatric symptoms. It should be noted that off-periods are not considered the same as untreated PD and may represent rebound worsening after the beneficial effect of levodopa has worn off. The task force recommends, in line with common practice, that patients with motor fluctuations be assessed for anxiety during "on" periods, unless the specific aim of the assessment is to rate the severity of anxiety in an "off" state. This recommendation is based on the fact that reviewed scales are generally designed to assess anxiety during the preceding 1 or 2 weeks. If the goal is to assess "off" period anxiety, a scale with a momentary time frame, such as the state version of the STAI, should be used. This advice is also in line with that given by the MDS task force reviewing depression scales.[17]

Given the overlapping features of anxiety and depressive disturbances, all anxiety scales have several mood and non-mood items that overlap with depressive symptoms. Moreover, apart from the STAI, all scales have symptoms that overlap with somatic and cognitive symptoms of PD as well. Here too an inclusive approach is advised in order to avoid interpretations and achieve maximum inter rater agreement.

The following unresolved issues in the area of anxiety rating scales require further research:

1. There is a critical need for validation studies of anxiety rating scales in PD. In spite of the fact that anxiety is considered an important psychiatric condition in PD, none of the available anxiety scales have been validated in this population. This is in sharp contrast with the number of validation studies for depression scales, as well as a number of scales for other non-motor symptom domains in PD such as psychosis, cognition, apathy, and quality of life.
2. The discriminative properties of anxiety scales for the various anxiety disorders should be further studied. The validation of anxiety scales should be conducted not only to establish reliability, but also against external diagnostic criteria for anxiety disorders. A scale may have good criterion validity for one anxiety disorder, but not for another. For instance, in non-PD patients the BAI was shown to have good criterion validity for panic disorder, but not for GAD or other anxiety disorders. Even though the diagnosis of an anxiety disorder should not be made on the basis of a cut-off score on a rating scale, in the study of specific anxiety disorders, it is desirable to have information on the ability to screen for, or predict, this specific disorder.
3. Further studies on the overlap of and distinction between anxiety and depressive disorders are needed both from a conceptual and a clinical viewpoint. The influence of depressive symptomatology on the scores of anxiety rating scales should be evaluated. If depression and anxiety are considered different syndromes, which at present they are, ideally an anxiety scale should reflect anxiety symptoms irrespective of the presence and severity of depressive symptoms.
4. Although anxiety does not seem to be related to cognitive decline, the influence of cognitive deterioration on anxiety scales should be evaluated, especially in the case of self-report scales.
5. In order to facilitate treatment studies of anxiety, sensitivity to change and minimal clinically relevant differences of the various anxiety scales should be studied.

6. There is at present no need to consider developing a new scale for PD-related anxiety until careful clinimetric testing of existing "suggested" scales is performed. However, if additional research shows that the clinimetric properties of existing are not satisfactory, the development of a new scale may be considered.

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