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Development and Validation of the Geriatric Anxiety Inventory

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ABSTRACT

Background:

Anxiety symptoms and anxiety disorders are highly prevalent among older people although infrequently the subject of systematic research in this age group. One important limitation is the lack of a widely accepted instrument to measure dimensional anxiety in both normal older people and older people with mental health problems seen in various settings. Accordingly, we undertook the development and initial testing of a short scale to measure anxiety in older people.

Methods:

We generated a large number of potential items *de novo* and by reference to existing anxiety scales and then reduced the number of items to 60 through consultation with a reference group consisting of psychologists, psychiatrists and normal older people. We then tested the psychometric properties of these 60 items in 502 normal older people and 46 patients attending a psychogeriatric service. We were able to reduce the number of items to 20. We chose a one week perspective and a dichotomous response scale.

Results:

Cronbach's alpha for the GAI-20 was 0.91 among normal older people and 0.93 in the psychogeriatric sample. Concurrent validity with a variety of other measures was demonstrated in both the normal sample and the psychogeriatric sample. Inter-rater and test-retest reliability were found to be excellent. Receiver operating characteristic (ROC) analysis indicated a cut point of 10/11 for the detection of Generalised Anxiety Disorder in the psychogeriatric sample with 83% of patients correctly classified with a specificity of 84% and a sensitivity of 75%.

Conclusions:

The Geriatric Anxiety Inventory (GAI) is a new 20-item self-report or nurse-administered scale that measures dimensional anxiety in older people. We have demonstrated that it has sound psychometric properties. Initial clinical testing indicates that it is able to discriminate between those with and without any anxiety disorder and between those with and without DSM-IV Generalised Anxiety Disorder.

Key words: Anxiety; Anxiety disorder; Aged; Aged, 80 and over; Generalised Anxiety Disorder; Psychological Test;

DEVELOPMENT AND VALIDATION OF THE GERIATRIC ANXIETY INVENTORY

Introduction

The prevalence of anxiety symptoms and anxiety disorders has been reported to decline with advancing age (Flint, 1994; Henderson et al., 1998). Despite this decline, anxiety in its various forms remains one of the most common psychiatric problems experienced by older people (Australian Bureau of Statistics, 1998). However, while anxiety is a common problem in older adults, anxiety symptoms and anxiety disorders remain both under-recognised and under-treated by health professionals (Scogin, 1998). This is despite the fact that anxiety disorders contribute to significant morbidity, loss of functioning, and lower quality of life (Blazer et al., 1991).

Anxiety disorders are more prevalent in older adults with chronic general medical conditions and are also highly co-morbid with depressive disorders (Beekman et al., 2000; Lenze et al., 2001). Anxiety disorders, however, remain less well studied in older adults than other disorders such as depression and dementia. An accurate picture of the true prevalence and incidence of anxiety disorders remains elusive (Krasucki et al. 1998). This may be due in part to methodological factors such as the use of diagnostic criteria and instruments not validated for use with older adults (Fuentes & Cox, 1997) and to response bias during epidemiological surveys (Jorm, 2000). Diagnostic difficulties, including problems of recognising age-specific symptoms, distinguishing symptoms of chronic physical disorders from the symptoms of anxiety, and the influence of age-related psychosocial issues on presentations of anxiety in later life have been increasingly discussed in the literature (Palmer et al., 1997).

There is little agreement as to a “classic” presentation of the common form of generalised anxiety in later life. Shapiro et al (1999) suggest both cognitive and affective components are fundamental, not only to a discussion of core aspects of the presentation of pathological anxiety, but also in terms of distinguishing anxiety from other conditions such as depression. There is also debate as to the degree to which anxiety may be distinguished from more commonplace occurrences like worry. In fact, as anxiety serves a necessary, indeed adaptive, function in the everyday lives of older people, its absence is neither natural nor desirable. However, it is unclear at which

point anxiety should be considered abnormal and maladaptive in older people. To further investigate these and a variety of other issues, a valid and reliable measure of anxiety in older people is needed.

Many instruments have been developed to measure the symptoms, distress levels and characteristics of the various anxiety disorders; the vast majority of these have been developed in and for young adult populations. Yet the importance of age-congruent norms is critical (Owens et al., 2000). A few such instruments [e.g. the Beck Anxiety Inventory (BAI; Beck et al., 1988)] have normative data for older populations. Some have been modified for use with older adults (e.g. the Adult Manifest Anxiety Scale – Elderly Version; Lowe & Reynolds, 2000). And a very few anxiety measures [e.g. the Short Anxiety Screening Test (SAST; Sinoff et al., 1999)] have been specifically designed for use with older adult populations. Instruments to measure anxiety levels can be constructed as clinician-rated or observational in nature (e.g. Hamilton Anxiety Scale; Hamilton, 1959; Maier et al., 1988) or can be designed as self-report measures (e.g. the State-Trait Anxiety Inventory; Spielberger et al., 1970; and the Padua Inventory; Sanavio, 1988).

However, many of these instruments, even those designed specifically for older adult populations, have shortcomings in terms of clinical and/or psychometric utility. These deficiencies fall into three main categories: a) many inventories (e.g. Hospital Anxiety and Depression Scale; Zigmond & Snaith, 1983) are found to be poor in detecting anxiety in older samples (Davies et al., 1993); b) many inventories (e.g. Beck Anxiety Inventory) are less suitable for older adults with mild cognitive deficits (e.g. wording of items and/or response sets too long or complex); and c) somatic items in some inventories (e.g. Goldberg and Bridges Scale; Goldberg et al.1988) fail to reflect the somatic nature of some older adults' manifestations of anxiety disorders (Turnbull, 1989) while resulting in too great an overlap with somatic symptoms of normal ageing, co-morbid medical conditions or medication side effects (e.g. shortness of breath in chronic obstructive pulmonary disorder or cardiac failure, conditions that are relatively prevalent in later life).

Some authors have argued that late-life anxiety scales should be able to measure the symptoms of anxiety in older adults with and without co-morbid depression, and in the latter situation, distinguish depression from anxiety (Beck &

Stanley, 1997). Others (Krasucki et al., 1998) challenge this idea, contending that distinguishing between symptoms of late-life anxiety and depression may be infeasible, simply because this co-occurrence reflects some convergence of depression and anxiety symptoms as part of a "normal" feature of mood disorders for many older patients.

In order to overcome the deficiencies of available anxiety self-report scales for older adults, a new instrument was designed specifically for use with an older cohort over a wide range of settings, including inpatient and nursing home settings. The instrument was intended to be kept relatively brief (20 items) to enhance clinical utility, was designed with a simple yes-no response format for ease of use with mildly cognitively impaired older adults, and was designed to maximize differentiation of somatic symptoms of illness and depression, as well as medication side effects, from anxiety symptoms. The instrument was designed to measure common symptoms of anxiety in older adults. It was not designed to diagnose anxiety disorders, but rather to measure symptom severity across a range of anxiety disorders and symptoms. In this way it was hoped the instrument could also be used to measure not only clinical symptoms of anxiety disorders but also subsyndromal expressions of anxiety (Heun et al., 2000), which have become a focus of recent research.

Method

Stage 1 – Development of items

A large variety of instruments designed to measure anxiety were examined in the process of selecting item content (see Table 1 for the complete list). From this wide range of instruments, 60 sample items were formulated. These items were chosen to reflect the primary domains covered in existing inventories: fearfulness, worry, metaworry (i.e., worry about worry), cognitions about anxiety, somatic symptoms of anxiety, anxious mood and anxiety sensitivity. These types of items were common across all or most extant scales, and broadly reflect anxiety symptomatology without being overly specific to any one type of anxiety disorder. The items chosen were either formulated *de novo* or adapted from existing items and checked against similar items which achieved high sensitivity for detecting anxiety, the highest correlations with anxiety factors, or which were most often endorsed by anxious participants in the literature (e.g. Gillis et al., 1995). A small number of items were reverse scored.

These 60 items were given to a small sample of healthy older adults, clinical psychologists and psychiatrists for comment on ease of understanding, age-appropriateness of language, and redundancy. The reference group also commented on such dimensions as face and content validity. The final response format, "agree" or "disagree" was chosen so as to be less categorical than the "yes/no" format favoured in instruments such as the Geriatric Depression Scale (Yesavage et al., 1983). The reference group also favoured use of the "agree" or "disagree" item response format. The item pool was refined and a few items reworded or substituted based on recommendations from this reference group. These 60 items were then piloted on two main samples: a large group of healthy community-dwelling older adults enlisted from two different sources and an outpatient sample of psychogeriatric patients, many of whom had DSM-IV anxiety and depressive disorders. Following this pilot work, a 20-item version of the scale was developed.

Stage 2 – Selection of final items of the GAI scale and their validation

Item total correlations

Two samples of older community-dwelling healthy adults were collected. The first sample consisted of older people (aged 42- 90 years; mean age = 69.45 years) participating in a larger survey of driving habits. The second sample consisted of 189 older people (aged 60-88 years; mean age = 71.4 years) drawn from a similar geographic and age cohort, also participating in a larger study of worry in older adults. The samples did not differ on demographics or response characteristics and so were combined to assess the internal consistency of the instrument. Characteristics of these samples are described in Table 2. The Cronbach's alpha coefficient of the original 60 items was calculated at 0.90. Each item was then correlated with the total scores in order to identify those 30 items which were most highly correlated with the total score. The final 10 items were discarded in order to reduce redundancy of constructs measured, to eliminate long items or those that were potentially problematic across a variety of settings, and to eliminate the few remaining reverse scored items; items with lower item total correlations were discarded if a choice between two similar items was made. These 20 items comprise the Geriatric Anxiety Scale (GAI) and are depicted in Table 3. All 20 items had corrected item-total correlations of .39 or above, with most above .50 (see Table 4). The resulting alpha coefficient for the GAI was 0.91. The GAI for this combined initial community sample had a mean of 2.3 (SD=3.8).

Missing data not a large factor in the initial large community sample, nor was non-response to particular items; it appeared that even the larger and necessarily more redundant 60 items were quite tolerable for older adults to complete. The 20 item final scale is well within the recommended minimum number of items for a scale with a single construct (Loewenthal, 2001). Item means for the 20 items are also given in Table 4.

Concurrent validity

This final 20 item version of the GAI was compared with other measures (Goldberg Anxiety and Depression Scale (GADS), STAI, Beck Anxiety Inventory (BAI; Beck et al., 1988), Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990), Life Experiences Survey (LES; Sarason et al., 1978) and the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988). Sample 1 received the GADS and the STAI- Anxiety; sample 2 received the BAI, PSWQ, LES and PANAS. Correlations for these are given in Table 5. All these measures are significantly inter-correlated with the GAI, suggesting that the GAI has good construct validity.

Stage 3 – Clinical testing of items: Further validation

Geriatric Psychiatry Sample

The GAI was further tested on a clinical sample consisting of a consecutive series of 46 older people with a mean age of 78.8 years (SD 6.7; range 66 – 94) attending a community geriatric psychiatry service. Thirty-four (74%) participants were female and 36 (78%) lived in their own homes. The remainder lived in retirement villages, aged hostels or nursing homes. All participants were white, English-speaking and free of clinically significant cognitive impairment. Their mean Mini-Mental State Examination (MMSE; Folstein et al. 1975) score was 28.1 (SD 1.6; range 25 – 30). Most participants were either married (28.3%) or widowed (43.5%). Their educational background was mixed, with 47.8% having had high school education or better. DSM-IV diagnoses were established using the Mini International Neuropsychiatric Interview [MINI version 5.0.0; Sheehan et al (1998)]. Eleven (23.9%) participants met diagnostic criteria for a current anxiety disorder, of whom eight (17.4%) had Generalised Anxiety Disorder (GAD). Ten participants met diagnostic criteria for current Major Depressive Disorder (MDD), of whom six had comorbid GAD.

Concurrent measures administered included the state component of the State-Trait Anxiety Inventory (STAI; Spielberger et al. 1970) and the Goldberg Anxiety Scale (GAS; Goldberg et al. 1988). Mean (SD; range) scores on these scales were as follows: STAI-State 36.3 (13.2; 20-70) and GAS 2.9 (3.4; 0-11).

The mean GAI score for this geriatric psychiatry patient sample (N = 46) was 5.22 (SD 5.83). Patients meeting DSM-IV criteria for any current anxiety disorder (N = 11) achieved a mean GAI score of 10.64 (SD 5.87) whereas patients meeting DSM-IV criteria for current GAD (N = 8) achieved a mean GAI score of 10.75 (SD 6.27). GAI score was not related to age (r_p = -0.12; p = 0.42), gender [F(1,44) = 0.59, p = 0.45] or cognitive function (r_p = 0.08; p = 0.61). Test-retest reliability was assessed by asking participants to complete the scale again one week later (0.91; p <0.0000). Inter-rater reliability was assessed by having a second rater score the GAI on the basis of an audiotape of participant responses (0.99; p <0.0000). Concurrent validity was assessed using Pearson product-moment correlations between the GAI and the other two measures of anxiety: GAI x STAI-S 0.80 (p <0.0000); GAI x GAS 0.70 (p < 0.0000). The ability of the GAI to discriminate between patients with and without any anxiety disorder [F(1,44) = 16.87, p = 0.0002] and with and without Generalized Anxiety Disorder in particular [F(1,44) = 10.56, p = 0.0022] was found to be good. However, there were insufficient participants with either MDD in the absence of GAD or GAD in the absence of MDD to perform a discriminant analysis between participants with only one of these disorders.

Stage 4 – Clinical cut-offs, sensitivity and specificity

We undertook a Receiver Operating Characteristic (ROC) analysis to identify the optimum GAI-20 cut point to distinguish geriatric psychiatry patients with GAD from those patients without GAD. The area under the ROC curve (AUC) was 0.80 (95% CI 0.64 – 0.97) and the optimum cut point was 10/11 (see Figure 1). This cut point correctly classified 83% of patients with a sensitivity of 75% and specificity of 84%. A similar ROC analysis to identify the optimum GAI-20 cut point to identify patients with any anxiety disorder (not shown) found an optimum cut point of 8/9, which correctly classified 78% of patients with a sensitivity of 73% and specificity of 80%.

Conclusions and recommendations.

We have described the development and initial field testing of a new brief self-report scale to measure anxiety in older people. Our preliminary data indicate that the twenty-item Geriatric Anxiety Inventory (GAI) has sound psychometric properties in both normal older people and in older patients of a geriatric psychiatry service. In developing the GAI, we had the specific intention that it would be suitable for the measurement of both the normal range of anxiety found in community residing older people and the pathological range of anxiety commonly seen in patients attending geriatric psychiatry services. We believe that the GAI is appropriate for these purposes.

GAI score is not significantly related to age or gender. The main limitations to the generalisability of our findings are the relatively small size of our clinical cohort and the ethnic homogeneity of all of our samples.

We are now testing the performance characteristics of the GAI in further cohorts of older people with mental disorders, including those with dementia of mild severity, as well as in older people with general medical conditions commonly associated with anxiety symptoms, including Parkinson's disease. We are also testing the sensitivity to change of the GAI in older patients being treated for Generalised Anxiety Disorder as well as Simple Phobias. Our findings from these studies will be the subject of future reports.

Conflict of Interest:

None.

Description of Authors' Roles.

The paper was jointly conceived and written by N.A. Pachana and G.J. Byrne. All authors made an equal contribution to the statistical design of the studies, and to collecting and analyzing the data.

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Table 1: Extant anxiety questionnaires used in item development

State-Trait Anxiety Inventory (Speilberger et al., 1970)
Padua Inventory (Sanavio, 1988)
Short Anxiety Screening Test (SAST; Sinoff et al., 1999)
Penn State Worry Questionnaire (Meyer et al., 1990)
Beck Anxiety Inventory (Beck et al., 1988)
Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983)
Anxiety Screening Questionnaire (ASQ-15; Wittchen & Boyer, 1998).
Adult Manifest Anxiety Scale – Elderly Version (AMAS-E; Lowe & Reynolds, 2000).
Anxiety Control Questionnaire (ACQ; Rapee, Craske, Brown & Barlow, 1996)
Anxiety Disorders Interview Schedule (DiNardo, O'Brien, Barlow, Waddell, & Blanchard, 1983)
Anxiety Sensitivity Index (ASI; Reiss, Peterson, Gurky & McNally, 1986)
Anxiety Status Inventory (ASI; 1971)
Anxious Thoughts Inventory (ATI; Wells, 1994)
Clinical Anxiety Scale (CAS; Snaith, Baugh, Clayden, Husain, & Sipple, 1982)
FEAR (Krasucki et al., 1999)
Fear Questionnaire (FQ; Marks & Mathews, 1979)
Goldberg Anxiety and Depression Scale (Goldberg et al., 1988)
Hamilton Anxiety (Rating) Scale (Hamilton, 1959)
Hopkins Symptom Checklist (SCL-90; Derogatis, Lipman & Covi, 1973)
Manifest Anxiety Scale (MAS; Taylor, 1953)
Profile of Mood States (POMS; McNair, Lorr & Droppleman, 1971)
Rating Anxiety in Dementia (RAID; Shankar, Walker, Frost, & Orrell, 1999)
Worry Domains Questionnaire (WDQ; Tallis, Davey, & Bond, 1994, more widely used version; Tallis, Eysenck & Mathews, 1992)
Worry Scale (Wisocki, 1988)
COPE (Carver, Scheier, & Weintraub, 1989)

Table 2: Characteristics of community sample

Demographic characteristics	Sample 1 (n=313) n (%)	Sample 2 (n=189) n (%)
Age (mean, standard deviation in years)	69.5 (8.9)	71.4 (5.5)
Gender -female	204 (66.7)	120 (63.5)
Educational Level -completed High School	227 (67.9)	128 (67.7)
Marital status - married	184 (59.0)	102 (54.0)
Country of birth - Australian born	Not assessed	141 (74.6)

Table 3.

GAI Scale

1. I worry a lot of the time.
2. I find it difficult to make a decision.
3. I often feel jumpy.
4. I find it hard to relax.
5. I often cannot enjoy things because of my worries.
6. Little things bother me a lot.
7. I often feel like I have butterflies in my stomach.
8. I think of myself as a worrier.
9. I can't help worrying about even trivial things.
10. I often feel nervous.
11. My own thoughts often make me anxious.
12. I get an upset stomach due to my worrying.
13. I think of myself as a nervous person.
14. I always anticipate the worst will happen.
15. I often feel shaky inside.
16. I think that my worries interfere with my life.
17. My worries often overwhelm me.
18. I sometimes feel a great knot in my stomach.
19. I miss out on things because I worry too much.
20. I often feel upset.

Table 4: Item total correlations

Item Number	Corrected Item Total (60)	Item Means (20)
GAI 1	0.61	0.16
GAI 4	0.41	0.20
GAI 8	0.47	0.19
GAI 10	0.54	0.14
GAI 11	0.50	0.07
GAI 12	0.52	0.21
GAI 17	0.58	0.17
GAI 27	0.50	0.05
GAI 28	0.53	0.11
GAI 29	0.39	0.05
GAI 30	0.57	0.18
GAI 33	0.54	0.14
GAI 34	0.53	0.09
GAI 35	0.50	0.09
GAI 38	0.50	0.04
GAI 39	0.59	0.07
GAI 45	0.65	0.12
GAI 47	0.50	0.06
GAI 48	0.45	0.08
GAI 60	0.52	0.10

Table 5: Correlations of GAI-20 with related measures-2 separate samples

Sample	Measure	Pearson correlation Co-efficient	Significance
Sample 1 (n=313)	GADS- Anxiety	0.59	p<0.001
	STAI-Anxiety	-0.42	p<0.001
Sample 2 (n=189)	BAI	0.63	p<0.001
	PSWQ	0.70	p<0.001
	LES	0.31	p<0.001
	PANAS – Negative	0.58	p<0.001
	PANAS-Positive	-0.34	p<0.001

ROC Analysis: GAI-20 x DSM-IV GAD Diagnosis