RAPID ANXIETY ASSESSMENT IN MEDICAL PATIENTS: EVIDENCE FOR THE VALIDITY OF VERBAL ANXIETY RATINGS¹

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ABSTRACT

Rapid assessment of patient anxiety is necessary to insure quality care. A number of self-report measures provide valid and reliable measures of anxiety. These measures can be timeconsuming to complete, however, and may be burdensome to medical patients who are in pain or acute anxiety states. Many medical procedures are performed in conditions in which written measures are cumbersome (e.g. patient in supine position), and scoring and interpretation of written measures in a busy clinical setting may be difficult for medical personnel. The present study provides validity data for a verbally administered (0-10) anxiety rating. One hundred and ninety-eight adult interventional radiology patients completed standard measures assessing state anxiety, trait Negative and Positive Affect, and the dimensions of the five-factor model of personality. Verbal anxiety rating was highly correlated with Spielberger's State Anxiety Inventory, showed moderate correlations to the related constructs of neuroticism and trait Negative Affect, and was largely unrelated to theoretically distinct constructs. Verbal anxiety ratings made prior to the invasive procedure also predicted pain and anxiety during the procedure. The verbal anxiety rating also demonstrated sensitivity to changes in anxiety that occurred as a result of changes in situation. Findings support the convergent and discriminant validity of verbal anxiety ratings.

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INTRODUCTION

Rapid assessment of patient distress during invasive medical procedures is important to insure quality care. Several wellvalidated instruments are available for the assessment of pain (e.g. McGill Pain Questionnaire) (1), anxiety (e.g. State–Trait Anxiety Inventory [STAI]) (2), and other aversive emotional states (e.g. Profile of Mood States) (3). These instruments can be timeconsuming to administer and score, however, and are often not well-accepted by medical personnel. In a busy medical setting, lengthy psychometric assessment may also be burdensome to patients in extreme distress or discomfort (4). The assessment of

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distress is especially important for medical personnel completing invasive procedures on conscious patients (e.g. interventional radiology procedures, brain surgery, dental surgery), as patient distress may lengthen procedure time and increase patient risk. The conditions experienced by patients undergoing invasive procedures (e.g. supine position, immobilization, dimmed lights) often preclude the use of written measures.

Although longer instruments are regarded as the "gold standard" for assessing patient distress, some efforts have been made to find shorter but equivalently valid assessment techniques. Keefe, Brown, Scott, and Ziesat (5) and others (6,7) have convincingly documented the validity of visual analogue scales for assessing pain. A few studies have also assessed the use of visual analogue scales for the assessment of aversive emotional states. Houtman and Bakker (8) reported moderately high correlations (.64-.77) of an anxiety visual analogue scale with the STAI in a sample of Dutch college students who completed measures prior to and following a written exam. Similar findings have been reported in a small sample of cancer patients (4) and in relatives of burn victims (9). Although suggestive of the utility of brief anxiety assessment techniques, these studies have been limited by small and homogenous samples and a relative lack of attention paid to issues of discriminant validity.

As part of a larger investigation assessing the efficacy of psychological interventions in reducing pain and anxiety during medical procedures, the present study investigated the validity and clinical utility of a verbally administered linear anxiety rating. Convergent and discriminant validity were assessed by examining the relationships between the verbal anxiety rating (VAR) and a number of standard psychometric instruments. First, convergent validity was assessed by examining the relationship between scores on the VAR and a widely-used anxiety instrument, the State–Trait Anxiety Inventory (2). We then explored convergent and discriminant validity more broadly by examining the relationships between the two state anxiety instruments and scores on instruments assessing broad personality characteristics, including the dimensions of the five-factor model of personality and the core dimensions of mood/emotionality.

The five-factor model of personality has gained considerable support as a descriptive taxonomy of the broadest personality traits (10-12). The most commonly used labels for these "Big Five" dimensions are: Neuroticism (versus emotional stability), Extraversion, Agreeableness, Conscientiousness, and Openness to Experience/Intellect. Evidence for the five-factor structure has been obtained from a variety of data sources across numerous and diverse samples (10-13), and Big Five dimensions have been

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shown to be related to clinically meaningful outcomes, including health-related behaviors and some aspects of psychopathology (14–17).

Considerable previous work has demonstrated that emotional experience is dominated by two global factors that are largely independent of one another: Negative Affect (NA) and Positive Affect (PA) (18). NA can be conceptualized as a general dimension of aversive emotional arousal; this construct encompasses a variety of lower-level unpleasant affective states, including anxiety, anger, guilt, and revulsion. High NA is characterized by negative emotional arousal, whereas low NA reflects a state of calmness (18). PA is a global dimension that includes feelings of engagement, alertness, enthusiasm, and joy. High PA is characterized by strong feelings of active engagement, whereas low PA reflects lethargy and sadness (18). These two largely independent factors have shown different patterns of relation to important psychological outcomes: NA (but not PA) is related to perceived stress, illness complaints, and poor coping; PA (but not NA) is related to social activity and life satisfaction (high PA) and depression (low PA) (19-22). NA and PA can be conceptualized as either state or trait variables. When conceptualized as trait variables, as in the present study, these dimensions reflect the propensity to experience the respective emotional states across a range of circumstances (23).

Taken together, the five-factor model of personality and the core dimensions of mood have considerable explanatory utility and generality. Some theorists have recommended that both new and existing assessment instruments be assessed in light of their relationships to the broader domain of personality constructs (16,24). For the purposes of the present study, these models provide dimensions that are both theoretically related and theoretically unrelated to state anxiety, permitting an examination of the convergent and discriminant validity of the VAR. Previous research assessing the construct of state anxiety has demonstrated moderate correlations between state anxiety and both trait NA and neuroticism (23-26). Thus, moderate correlations between the VAR, neuroticism, and trait NA would be additional support of the convergent validity of the VAR. Low correlations between the VAR and the other dimensions assessed-trait PA, Extraversion, Conscientiousness, Agreeableness, and Openness--would support the discriminant validity of the VAR. Based on the literature, we made a number of predictions concerning the convergent and discriminant validity of the VAR. Specifically, we hypothesized that the VAR would be highly correlated with the STAI, the VAR and STAI would both be moderately correlated with Neuroticism and trait NA, and the two state anxiety instruments should be largely unrelated to the other constructs measured. However, given previous findings that some STAI items appear to reflect low PA rather than high NA (18), we anticipated that the STAI might be negatively associated with PA.

Previous literature has suggested that preoperative anxiety is associated with greater anxiety and discomfort during medical procedures (27–29). As an additional check of the validity of the VAR, we investigated the relationship between the preprocedure anxiety indices and procedure pain and anxiety ratings. Based on the literature, we anticipated that preprocedure VAR and STAI scores would predict procedural pain and anxiety. Finally, we expected that the VAR would be sensitive to changes in situation; this led to our prediction that the postprocedure VAR would be significantly lower than the preprocedure VAR. Although we anticipated that the VAR would drop following the procedure, we expected moderate temporal stability in anxiety ratings during the procedure.

METHOD

Participants

Participants were adult patients undergoing invasive radiological procedures (e.g. angioplasty, nephrostomy) typically performed under intravenous conscious sedation. Use of this sample provided a rigorous test for the VAR, as it allowed for repeated measurement of anxiety before, during, and after a stressful medical procedure. Potential participants were screened for cognitive impairment with a shortened version of the Mini-Mental State Exam (MMSE) (30). Patients who were not oriented, or who scored below 24 on the MMSE were excluded.

Eighty percent of patients contacted agreed to participate in the study. Of the 270 patients who consented to participate, 13 were eliminated for mental status reasons, and 16 were eliminated for miscellaneous medical reasons (e.g. upon initial examination of the patient, it was determined that the procedure was not necessary), yielding a sample of 241 participants. After the procedure, participants also received a questionnaire packet to complete upon their return home. Of the 241 participants, 210 completed and returned the questionnaire packet (88%). Twelve individuals returned incomplete questionnaires, yielding a final sample of 198 participants providing complete data.

One hundred and two women (52%) and 96 men (48%) provided complete data. Participants ranged in age from 18 to 92, with a mean age of 54.2 years (SD = 16.2). Participants reported a mean of 12.5 years of education (SD = 2.6). Ethnically, the sample consisted of Caucasian (95%), African-American (4%), and Native American (1%) individuals. Over half (59%) were married, 20% were single, and the remainder were widowed (11%) or divorced/separated (10%). Participants reported an average of 5.1 previous invasive medical procedures (SD = 5.4). The sample represented a broad range of medical problems from relatively minor conditions (e.g. hypertension) to chronic disease states, including coronary artery disease, end-stage renal disease, and cancer.

Procedure

Participants provided consent and completed questionnaires in the patient preparatory area immediately prior to the interventional radiology procedures. Following mental status screening, patients completed the State-Trait Anxiety Inventory—state version (2), and the Positive and Negative Affect Schedule—trait version (PANAS) (18). Patients were then asked to provide a verbal anxiety rating on a 0-10 linear numerical scale. Patients also provided a separate subjective pain rating on a 0-10 scale. For the anxiety scale, patients were told that a rating of zero signified *no anxiety*, and 10 denoted the *feeling of being terrified*. For the pain scale, patients were instructed that a rating of zero signified *no pain at all*, and a rating of 10 indicated the *worst pain imaginable*.

Subjective anxiety and pain ratings were also obtained every 15 minutes during the interventional radiology procedures, and participants provided postprocedure anxiety and pain ratings. Following the procedure, patients were given a questionnaire packet and a return envelope, with instructions for the measures and a request to complete and return the questionnaire within 2 weeks. The Big Five Inventory (BFI), a measure assessing the dimensions of the five-factor model of personality (31), was

Scale	Median	Mean	SD	Range
Verbal Anxiety Rating	3.00	3.69	2.77	0-10
STAI	43.00	42.95	11.83	2069

Note: N = 198. STAI = State-Trait Anxiety Inventory, state version.

included in the questionnaire packet. Patients were paid \$10.00 for completing and returning the questionnaires.

Measures

The state anxiety version of the STAI (2) is a 20-item self-report measure that assesses situational feelings of anxiety. Each item consists of a self-descriptive statement (e.g. "I am calm," "I am tense") rated on a 4-point Likert-type scale ranging from 1 (*not at all*) to 4 (*very much so*). Ten of the 20 items are reverse-scored. The state anxiety index of the STAI yields a single summary score. The STAI has shown convergent validity with other anxiety instruments (32). Internal consistency within the present sample was excellent (alpha = .92).

The PANAS (18) consists of two 10-item scales for positive affect and negative affect. The PANAS can be administered with eight different temporal instructions, ranging from how the person feels at the moment to how the person feels in general. For the present study, subjects were asked to rate how they feel in general (trait version). Each affect descriptor is scored on a Likert-type scale from 1 (*very slightly to not at all*) to 5 (*extremely*). PANAS self-ratings show significant correlations with peer ratings (33). Internal consistency within the present sample was good for trait NA (alpha = .81) and trait PA (alpha = .81).

The BFI (31) is a 44-item self-report inventory of personality description items. Respondents are asked to rate the extent to which they believe that the items are descriptive of themselves on a Likert-type scale ranging from 1 (*disagree strongly*) to 5 (*agree strongly*). The BFI assesses the robustly found largest five dimensions of personality. The scale was developed from a lexically derived set of personality descriptors using factor analytic techniques (31). Scales on the BFI are correlated with other measures of these dimensions, including the NEO-FFI (34), with correlations ranging from .68 (openness) to .90 (conscientiousness). BFI self-ratings are also significantly related to peer ratings, with correlations ranging from .30 (agreeableness) to .70 (extraversion) (31). BFI subscales had acceptable internal consistency within the present sample, with Cronbach's alphas ranging from .73 (agreeableness) to .80 (neuroticism).

RESULTS

Descriptive statistics for the anxiety measures are presented in Table 1. As might be expected of patients about to undergo an invasive medical procedure, preprocedure anxiety scores appeared moderately elevated. Self-reported anxiety on the STAI was significantly higher than adult state anxiety norms, t(1613) = 9.32, p < .01 (2). Women (M = 45.69, SD = 12.02) scored significantly higher than men (M = 40.04, SD = 12.02) on the STAI, F(1, 196) = 11.88, p = .001. Women (M = 4.54, SD = 2.79) also scored significantly higher than men (M = 2.78, SD = 2.45) on the VAR, F(1, 196) = 22.36, p < .001. Anxiety scores on both instruments were unrelated to age and years of education and did not differ significantly for different marital status or ethnicity groups (ps > .09).

TABLE 2

Correlations	between	Preprocedure	Anxiety	Measures	and	Other
Scales and Si	gnificance	Tests for Diffe	erences be	etween Two	Dep	endent
		Correlati	ons		-	

t	
1.65	
2.44*	
1.85	
2.15*	
1.22	
2.08*	
0.11	

Note: N = 198.

* p < .05, ** p < .01, *** p < .001.

Correlations between Measures

Preprocedure verbal anxiety ratings were highly correlated with STAI score, r(198) = .73, p < .001, supporting the convergent validity of the VAR. Due to the relationship between gender and anxiety, these correlations were recalculated separately for men and women. Results indicated that preprocedure VAR was highly correlated with STAI score for both women, r(102) = .72, p < .001, and men, r(96) = .69, p < .001. The relationship of both preprocedure anxiety measures to trait NA, trait PA, and the dimensions of the five-factor model are presented in Table 2. In general, scores on these state anxiety measures showed similar relationships to the trait measures. As expected, both state anxiety measures were moderately correlated with trait NA and Neuroticism. Both measures were also negatively associated with Conscientiousness. In addition, scores on the STAI were negatively associated with trait PA, Extraversion, and Agreeableness. In order to determine if the STAI and VAR were equally related to the trait constructs, significance tests for differences between two dependent correlation coefficients were conducted (35,36). These tests formally assessed differences in the degree of association of the two state anxiety measures to the trait constructs. This statistical methodology has been used in prior investigations of instrument validity (37). In general, scores on the trait-based measures were more strongly related to the STAI scores than to the verbal anxiety ratings (see Table 2). These differences were statistically significant for PA, Extraversion, and Agreeableness.

Correlations with Outcome

The interventional radiology procedures required an average of 75 minutes to complete (SD = 38 minutes); participants provided an average of 4.7 pain ratings and 4.7 anxiety ratings during the procedures. Procedure pain and anxiety ratings were averaged and then correlated with the baseline anxiety indicators. Correlations between preprocedure anxiety scores and average procedure pain and anxiety are reported in Table 3. Both preprocedure anxiety indices significantly predicted self-reported pain and self-reported anxiety during the interventional radiology procedures. The two anxiety measures did not differ in ability to predict procedure pain and anxiety, thus supporting the predictive validity of the VAR.

Sensitivity of the VAR

A repeated measures analysis of variance was conducted to assess changes in verbal anxiety rating from preprocedure to postprocedure and to gauge the sensitivity of the VAR. As expected, postprocedure anxiety rating (M = 1.05, SD = 1.90)
 TABLE 3

 Relationship of Preprocedure Anxiety Indices to Procedure Pain and Anxiety and Significance Tests for Differences between Two Dependent Correlations

	VAR	STAI	t
Mean Procedure Pain	.26***	.30***	0.56
Mean Procedure Anxiety	.47***	.44***	0.34

Note: N = 198.

* p < .05, ** p < .01, *** p < .001.

was significantly lower than the preprocedure anxiety rating (M = 3.69, SD = 2.77), F(1, 188) = 151.93, p < .001.

Test-Retest Reliability

Although it could be argued that high test-retest reliability in a sensitive state measure may not necessarily be a prerequisite for validity (38), reliability coefficients were calculated for the VAR to provide information regarding temporal stability of verbal anxiety ratings. Stability of the VAR was assessed by examining the correlations between the first four procedural anxiety ratings. Only the first four ratings were used for this analysis because, due to differential procedure length, the sample size decreased substantially after the fourth rating. The average test-retest correlation between the first four adjacent 15-minute anxiety ratings during the interventional radiology procedures was .66, suggesting moderate to high stability in anxiety scores during the procedures. One-hour test-retest reliability was determined by correlating the initial procedure anxiety rating with the fourth procedure anxiety rating, completed 1 hour later (n = 130). One-hour stability was moderate (r = .55) and similar to 1-hour test-retest reliability of the STAI (2).

DISCUSSION

This article provides validity data for a brief, verballyadministered anxiety rating that may prove useful for the assessment of anxiety in medical settings. Advantages of the VAR include rapid administration and immediate interpretability, without the need for scoring procedures. In addition, the verbal administration does not require literacy and has advantages in medical settings in which written formats may prove unfeasible. The VAR may also be useful in nonmedical settings where repeated, intensive measurement of anxiety is needed.

The overall pattern of correlations between the VAR, STAI, and other instruments supports the convergent and discriminant validity of the VAR. The VAR showed good convergent validity with the STAI, a standard instrument for anxiety assessment. The VAR was significantly correlated with two theoretically related constructs—trait NA and Neuroticism—in a manner similar to the STAI. The VAR also displayed good discriminant validity from a number of theoretically unrelated personality factors including trait PA, Extraversion, Agreeableness, and Openness/Intellect.

In general, the pattern of relations between the VAR and personality factors was similar to the pattern exhibited between the STAI and personality factors. The two anxiety instruments did differ, however, in their relationships to three trait variables: trait PA, Extraversion, and Agreeableness. In all cases, the STAI showed a significantly stronger pattern of relation to these individual difference variables than did the VAR. Previous research has indicated that some STAI items (e.g. feeling pleasant, self-confident) appear to assess low PA, rather than high NA (18). The interpretation of STAI scores is thus complex, as it assesses both high arousal (anxiety/NA) and low engagement (PA/ Extraversion). The VAR appears to be relatively free from this form of conceptual complexity. In the present sample, some STAI items (e.g. feeling satisfied) also appeared to tap low Agreeableness. Individuals scoring higher on the Conscientiousness subscale of the BFI also reported less preprocedure anxiety, as assessed by both the VAR and STAI.

Previous research with medical populations has demonstrated that preoperative anxiety is associated with greater postoperative pain (39) and greater anxiety and pain during invasive procedures (27-29). State anxiety has also been associated with greater pain perception in laboratory studies (40). In the present study, preprocedure VAR and STAI scores were equally predictive of selfreported pain and anxiety during the invasive medical procedures, replicating previous research and further supporting the utility of a 1-item anxiety rating. Although both anxiety measures were significant predictors of pain during the interventional radiology procedures, it should be noted that anxiety accounted for a modest amount of variance in procedure pain. Most participants expressed relief after the interventional radiology procedures were completed. This reduction in anxiety appeared reflected in the significant drop in VAR from preprocedure to postprocedure; this finding suggests that the VAR is sensitive to changes in anxiety that occur as a result of changes in the environment. Consistent with previous research (41), women in the present sample reported greater preoperative anxiety than men, as assessed by both anxiety instruments. Despite the gender differences in preprocedure anxiety, the VAR showed equal convergent validity with the STAI for both men and women.

In a recent editorial, Wittchen (42) notes that the field would benefit from additional methods for screening individuals for clinical levels of anxiety. Although many published measures would serve well in a screening role (2,43), such measures are not always available, practical, or well-accepted by medical personnel. The VAR may have some utility as an anxiety screening device. An examination of a regression plot of the present data reveals that a score of 5 on the VAR is roughly equivalent to a score of 49 on the STAI, the mean STAI score of patients diagnosed with anxiety disorders (2). Although the present study was not designed to test a method of screening clinical anxiety, the authors tentatively suggest that scores of 5 or greater on the VAR may indicate the need for further assessment of a patient's anxiety.

Limitations and Qualifications

A number of limitations of the present study should be noted. Although the present study provides evidence for the discriminant validity of verbal anxiety ratings, it should be noted that not all dimensions of potential interest were assessed. For example, the present study does not provide information regarding the extent to which VAR scores overlap with measures of depression. In addition, the present convenience sample was disproportionately Caucasian and relatively well-educated. Results may not be generalizable to all populations of interest.

These limitations are offset by the strengths of the present study, which include the use of a large sample of patients with a diversity of medical problems, and the assessment of a broad range of personality constructs. Overall, results of the present study suggest that the VAR represents a valid brief alternative for anxiety assessment. The anxiety rating was highly convergent with an accepted measure, differed from theoretically unrelated constructs, and was sensitive to changes in situation. The VAR is an efficient tool for the assessment of anxiety and may be particularly useful in

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a busy clinical setting in which longer standard instruments are not practical.

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