

Validation of Anxiety Sensitivity Index (ASI-16) on a Nonclinical Sample of Rwandans: A Cross-sectional Study

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Abstract

Introduction: Globally, anxiety diseases are considered as mental health concerns which increase mortality and morbidity. Anxiety sensitivity refers to the tendency of individuals to fear from anxiety-related symptoms due to the belief that these symptoms may have destructive consequences.

Method: This cross-sectional study was conducted to validate Anxiety Sensitivity Index (ASI-16) on a non-psychiatric sample of 90 recruited students from the University of Rwanda. The recruited participants were aged 19 to 37 years [(Mean age (M)=23.9, SD = 3.69)]. Both descriptive and analytical analyses were performed using Statistical Package for the Social Sciences (SPSS version 22). Alpha of Cronbach was used to assess the ASI-16 reliability. State-Trait Anxiety Inventory-Trait (STAI) was used to assess the criterion related concurrent validity. The Beck Depression Inventory (BDI) was used to measure the criterion related divergent validity. Factor Analysis was used to assess the ASI-16 the construct validity.

Results: The findings confirmed a good internal consistence (Cronbach's Alpha, $\alpha = 0.83$). The results revealed the ASI-16 criterion related convergent validity of ASI-16 ($r = .59$; $p = .000$; ASI and STAI) and criterion related concurrent validity ($r = .069$; $p = .51$; ASI and BDI). The factor analyses indicated an overlapping of physical, psychological and social aspects attesting that ASI is one-dimensional tool assessing anxiety symptoms. More than a quarter of items seemed to assess all three factors of ASI; this attested that there were interconnections between physical, psychological or cognitive and social aspects. The participants who scored highly were considered to have the anxiety symptoms. In this sample, the t-test was computed to compare males and females on the ASI-16 total scores and showed that there was no significant difference at 5% level [(Mean of males=29.3, Mean of females=29.57), $t(26.176)$ at $p = .000$].

Conclusion: The results confirmed that ASI-16 seems to be valid and reliable to screen anxiety symptoms in a Rwandan sample. The norms of ASI should be constructed on the Rwandan population.

Keywords: Sensitivity, Anxiety Sensitivity, Anxiety Sensitivity Index, Factor Structure, Reliability, Validity

Introduction

The anxiety diseases are among the most common mental disorders that contribute to increasing morbidity and mortality worldwide [1,2]. They affect the quality of the health of people who experience various problems including physiological, psychological and social problems [3]. The global prevalence of anxiety disorders varies from 0.9% and 28.3% [4]. The prevalence of anxiety disorders is high in women compared to man at a ratio of 2:1 ratio [5]. Anxiety disorders have been major concern problems in Rwanda for a long time, especially from the 1994 genocide against Tutsis which caused psychological impacts on all Rwandans. After this tragedy, many studies indicated that anxiety diseases increased [6,7]. A large number of researchers stated that anxiety is one of the negative emotional

experiences accompanied by several predictable physiological, social, cognitive, emotional and behavioral changes [8,9].

The sensitivity of a scientific test is an important characteristic. It refers to the ability of the test to correctly ascertain the patients with the disease. A high sensitivity is clearly important where the test is used to identify patients who suffer from a certain mental disorder. To make sure that the ASI was psychometrically valid and reliable, its sensitivity was described to determine whether ASI had the ability to detect a true positive sensitivity, being based on the true positive rate, reflecting a test's ability to correctly identify all people who had the anxiety disease [10].

Anxiety sensitivity (AS) refers to the fear of behaviors or sensations associated with the experience of anxiety. Bodily sensations related to anxiety are mistaken as a harmful experience causing more intense anxiety or fear [11]. For example, a person may fear the shakes as impending neurological disorder. Anxiety Sensitivity (AS) has many theories from different authors all over the world. Actually, AS refers to the person's tendency to fear anxiety related symptoms due to the belief that these symptoms may have harmful consequences. The harmful symptoms related to AS are physical, psychological and social concerns which are the main factors of this psychological index [12]. Stress symptoms of anxiety disorders are classified into three main dimensions of AS that are somatic sensations, cognitive and social dimensions. The previous correlational and longitudinal studies conducted on adults and adolescents demonstrated that AS was higher in men compared to women. Eligible studies have shown that individuals with high AS are most likely to develop anxiety pathology. Previous studies confirmed that high AS leads to chronic pain and somatic disorders [13], phobia (mainly social performance phobia), social phobia [14], anxiety diseases [12], substance use disorders, depressive disorders and psychotic diseases [15].

The ASI is a psychiatric scale developed to measure the sensitivity of individuals [16]. The ASI was used to identify its applicability on reducing the effects of stress due to the apprehension of examinations as an effective test to psychological assessment of anxiety disorders. It is a psychometric test that contains 16 original items basing on the factor analysis. Furthermore, the individuals are asked to demonstrate how they experience specific symptoms of anxiety disorders [17]. Previous studies which have been conducted on ASI and have included the test-retest reliability, internal consistency, and construct validity of the ASI were well documented [18]. Subsequently developed multidimensional measures have unstable factor structures or measure only a subset of the most widely replicated factors. The ASI is to reduce anxiety symptoms to a manageable level and to empower people with anxiety so that they have control in testing situations they encounter [17,19]. More comprehensively, ASI measures the lower-order factors of AS (physical, psychological and social) and consists of 36-items. The ASI-R retains the same instructions and response formats

as the ASI, and contains 10 of the 16 ASI's original items. Six items from the original ASI with problematic content were eliminated, including three of the five identified psychometrically deficient items [20]. Through the factors of ASI, the fear presented by individuals includes the fear of cardiovascular, respiratory, gastrointestinal, publicly observable, dissociative and neurological, and cognitive dyscontrol anxiety symptoms [20]. By using ASI, the severity of anxiety diseases was measured and the measurement of how anxiety has numerous impacts on human beings within their daily experiences was assessed. On a 4-point scale ranged from 0 (very little) to 4 (very much), subjects indicated the degree of aversion to different anxiety symptoms described in 16 items. The total score is the sum of scores on individual items and varies between 0 and 64 [17]. Previous studies have confirmed a high internal consistency of ASI-16 with Cronbach's α ranged from 0.82 up to 0.88 [21,22].

Anxiety is a complex psychological construct that has three components including verbal cognitive component, behavioural component and physiological component. This psychological condition characterised by emotional reactions that depends on the personal feelings can be affected by both external and internal stimuli [11]. Anxiety is not just one disease but a set of diseases characterised by persistent feelings of high anxiety, and extreme discomfort and tension [4]. The verbal-cognitive component refers to worry scales in which individuals self-report how anxious they are. The behavioural component refers to any escape or avoidant actions taken by an individual to leave potentially threatening or anxiety provoking situations. The physiological component refers to physical measures of anxiety characterised by heart rate, respiration, and cortisol changes [16].

Furthermore, anxiety is more future-oriented and global, referring to the state in which an individual is inordinately apprehensive, tense, and uneasy about the prospect of something terrible happening [4]. The anxiety disorders happen when an individual has a feeling that something terrible is going to happen and that he is powerless to change it. The people with anxiety disorders are incapacitated by chronic and intense feelings of anxiety, feelings so strong that they are unable to function on a day-a-day basis [23]. Anxious people experience it at different degrees. At the low end of the intensity range, anxiety is normal and adaptive whereas at the high end of the intensity range, anxiety becomes pathological and maladaptive [24]. Moreover, anxiety becomes a problem when it overstays its duration, and is of an intensity which begins to interfere with a person's functioning and overall well-being. The duration, intensity, and frequency factors distinguish normal, adaptive anxiety from abnormal to pathological anxiety. When the factors of anxiety become distressful and chronic, such that it interferes with functioning of people, it is often referred to as pathological anxiety. The main criteria used to distinguish normal anxiety from an anxiety disorder is that it results in significant distress, or impairs social, occupational, or other important areas of functioning [25]. The symptoms of anxiety disorders vary depending on the type of anxiety

disorder, but they often have general symptoms including panic, extreme fear, restlessness, uncontrollable, obsession, flashbacks of traumatic experiences, nightmare, ritualistic behaviours, eating and sleeping disturbance, sweaty, shortness of breath, palpitations, dry mouth, dumbness, hopelessness, nausea, muscle tension and dizziness. Therefore, accumulating evidence suggests that ASI plays an important role in treating anxiety disorders [5].

In the aftermath of 1994, many Rwandans have developed different types of anxiety disorders [26] including phobias, Post-Traumatic Stress Disorder [27], Panic Attacks (PA), Obsessive Compulsive Disorder (OCD), and Generalized Anxiety Disorder [28]. These disorders are related to the 1994 genocide perpetrated against Tutsis, trans-generational factors of trauma and other biopsychosocial problems such as family conflicts, extreme poverty, complicated diseases and other problems that weaken the quality of life of Rwandans. These problems cause them to react differently due to their anxious situations and makes them develop physical, behavioral and emotional problems [7]. In Rwanda, the survivors of the 1994 genocide perpetrated against Tutsi faced anxiety disorder. The main purpose of the study was to validate the ASI on a nonclinical sample of Rwandans, among the students of University of Rwanda-Huye Campus. The study focused on how the basic dimensions of anxiety sensitivity are related to numerous forms of psychopathology [19]. Previous studies indicated that AS plays a crucial role in anxiety and health behaviors [31].

Following the 1994 genocide perpetrated against Tutsi, millions of Rwandans from families, all institutions including health facilities, colleges and other institutions that provide different services have experienced anxiety associated with the traumatic events. They were affected by the 1994 genocide perpetrated against Tutsi that had caused AS [32,33]. The previous researchers and professionals of mental health in Rwanda used the interview, and observations to assess anxiety disorders. No study is yet carried out to validate the ASI-16 on a Rwandan Sample. The purpose of this study was to validate the ASI on a nonclinical sample of Rwandans in order to determine its psychometric properties. A convenient student's sample was used during this study.

Method

A cross-sectional study was conducted to validate ASI-16 on a non-psychiatric sample of 90 recruited students from the University of Rwanda. The ASI-16 Internal Consistency, Criterion Related Validity (Concurrent and Divergent Validity) and Construct Validity (using Factor Analysis) were assessed.

A non-clinical convenient sample of 90 participants (54 females and 36 males) aged from 19 to 37 years old ($M = 23.9$, $SD = 3.69$) from undergraduate students of the University of Rwanda, College of Arts and Social Sciences-Huye Campus were recruited to participate in this study. No data was reported about the clinical background of these subjects because ASI was authenticated on the nonclinical Rwandan sample to determine its applicability

on a non-psychiatric sample in Rwanda. The included participants were with no history of psychiatric treatments. The Gorsuch's formula [34] was performed to estimate the sample size and the 10% extra-participants were added to the sample size. They completed the questionnaires independently. The study was reviewed and approved by the Clinical Psychology Department Council of the University of Rwanda. Prior to their evaluation, the subjects completed the self-report measures that had the description. Before participating, they were also informed about the purpose, risks and benefits of the study. They were also informed that participation was voluntary. The psychological tests used in the study were translated from English into mother-tongue of the respondents (Kinyarwanda). The subsequently back-translated basing on professional translators was completed. As ASI was a new psychometric tool in Rwanda, the piloting test was performed on the students from the College of Medicine and Health Sciences (CMHS) for determining the reliability and validity of the ASI. An informed consent was obtained and they were informed that their responses would be kept in confidential and privacy.

State-Trait Anxiety Inventory-Trait Trait (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) is a 40-item scale that measures the stable propensity to experience anxiety and the tendency to perceive stressful situations as threatening. The 20 items allocated to each of the State-Anxiety and Trait-Anxiety subscales. The items of this inventory are rated from 1 (almost never) to 4 (almost always) on a 4-point Likert-type scale. The total score in the scale ranges from 20 to 80. It has high test-retest reliability, internal consistency, and concurrent validity with other anxiety questionnaires. In this study, STAI was used to assess the criterion related convergent validity.

Beck Depression Inventory version two (BDI-II) is a 21-item self-report scale carried out to measure the severity of depressive symptoms experienced by the individuals during the two past weeks before data collection [36]. It is a Likert-type scale. It has excellent reliability and validity and is widely used in non-clinical or medical settings. It was developed to measure the level of depression and consists of 4 statements representing the variability of depression levels [37]. In the current study, BDI was used to measure the severity of depressive symptoms and as depression was a distinct entity from anxiety, BDI was used to measure the criterion related divergent validity.

The ASI-16 is a psychometric tool used to measure the human sensitivity basing on three measured components which were expectancy, AS, and evaluation sensitivity. It is used to measure the fear of anxiety-related sensations based on beliefs about their harmful consequences. Total scores change from 0 to 144. The participants indicate each item on a 5-point Likert-type scale (0 = very little to 4 = very much). This inventory confirmed excellent internal consistency and adequate validity in preliminary studies. It has 16 items to be classified into three major dimensions (including physical, psychological and social) found in its originality [16,20].

Both descriptive and analytical analyses were performed

using Statistical Package for the Social Sciences (SPSS version 22). The total scores for ASI were differently ranged from 0 to 64. The participants who had scores 0 to 7 were considered to have no anxiety, 8 to 15 (mild anxiety), 16 to 25 (moderate anxiety), and 26 to 63, severe anxiety. The quantifiable variables were expressed as mean ± Standard Deviation (SD). Pearson correlation coefficients were also computed to examine the associations between the BDI, ASI-16 and STAI. Therefore, the cut-off that allowed us to consider the recruited subjects as who had anxiety diseases was 8. In all analyses, a 2-tailed p-value at 0.05 was considered to designate statistical significance and 95% confidence intervals. The varimax rotation was analysed in order to obtain factors highly correlated with some variables and lowly correlated with others. Thus, this could allow a clear typology of variables.

Results

Descriptive statistics was performed in this study. Results showed that the mean, median, mode, standard deviation, Skewness, Kurtosis and Variance of ASI were 29.47, 30, 36, 10.68, -0.187, -1.225 and 114.14 respectively. ASI, STAI and BDI had theoretical normal tendencies because their means, medians and modes were not very different. The sample of 90 participants was compromised of adults aged older than 18 for both genders, most of which were females 54 (60%). The results indicated that the youngest respondents were aged 19 years and the oldest were 37 years old. The ages of the participants were grouped into four categories in which the participants aged 19-23 were 40 (44.4%), 24-29 were 35 (38.9%), 30-35 were 12 (13.3%) and 36-41 were 3 (3.3%). The majority of the respondents were founded to be aged 19-23 years. The results confirmed a good internal consistency (Cronbach’s Alpha, α= 0.83). To determine the convergent and concurrent validity, Pearson’s correlations was performed. The results revealed that the ASI-16 had a good criterion related convergent validity (r=.59; p=.000; ASI and STAI) and a good criterion related concurrent validity (r=.069; p=.51; ASI and BDI). The validity of the ASI dimensions was also assessed and the results showed a good criterion related validity attested by strong correlations with STAI and low levels of correlations with BDI.

Table 2 indicated the correlation between the physical,

psychological and social concerns of ASI. Factor analysis reveals that the findings showed an overlapping of physical, psychological and social aspects attesting that ASI is a one-dimensional tool assessing anxiety symptoms. More than a quarter (1/4) of items seemed to assess all three factors of ASI. This fact attested that there were interconnections between physical, psychological or cognitive and social aspects.

Varimax rotation was used in order to obtain factors highly correlated with some variables and lowly correlated with others. Thus, this could allow a clear typology of variables. The results revealed that ASI is a one-dimensional tool assessing anxiety symptoms. The table below presents loadings after the Varimax rotation (Table 3).

Table 3 includes the weigh load normalized of the study that was performed using varimax rotation. The items strongly loaded had values greater than 0.45 whereas items weakly loaded had values less than 0.45. The structure didn’t present a clear typology of variables. On the other hand, the t-test was computed to compare males and females on the ASI-16 total scores and showed that there was no significant difference at 5% level [(Mean of males=29.3, Mean of females=29.57), t (26.176) at p=.000]. Therefore, the results confirmed a non-significant difference between females and males on ASI’s scores. There was evidence at 95% that the sex variable had no influence in responding to the ASI.

Discussion

This study aimed to validate the ASI-16 on a non-psychiatric convenient sample of 90 University of Rwandan students. The findings revealed a good internal consistence (Cronbach’s Alpha, α= 0.83). These findings were supported by the findings of the previous studies that showed that the internal consistency of ASI was highly consistent with the value between (α=0.82) and (α=0.93) (21,22). Alpha of Cronbach greater than .80 was considered to be an excellent coefficient [38]. The results confirmed the criterion related convergent validity of ASI (r=.59; p=.000; ASI and STAI) and criterion related concurrent validity (r=.069; p=.51; ASI and BDI). Using factor analysis, the findings showed an overlapping of physical, psychological and social aspects attesting that ASI was a one-dimensional tool assessing anxiety symptoms (Table 2).

Table 1. The correlations between ASI, ASI factors, STAI and BDI

ASI-16 and its factors	1	2
	STAI-T	BDI-II
ASI total scores	r=.595; p=.001*	r=.069; p=.519
Factor 1: Psychological factor	r=.488; p=.001*	r=.113; p=.287
Factor 2: Physical factor	r=.557; p=.001*	r=.057; p=.591
Factor 3: Social factor	r=.373; p=.0001*	r=-.067; p=.533

Note: ASI: Anxiety Sensitivity Index, STAI-T: State-Trait Anxiety Inventory, BDI-II: Beck Depression Inventory version, () it indicated that there was a significant correlation at .005 while (**) indicated that there was a significant correlation at .001 levels.*

Table 2. Correlations between physical, psychological and social factors and ASI items

Category	Items	Factors		
		Physical	Psychological	Social
Physical concerns	It is important to not appear nervous.	r=.752, p=.0001*	r=.752, p=.0001*	r=.082, p=.445
	It scares me when my heart beats rapidly.	r=.341, p=.001*	r=.456, p=.0001*	r=.298, p=.004**
	It embarrasses me when my stomach growls.	r=.439, p=.0001*	r=.670, p=.0001*	r=.102, p=.339
	It scares me when I become short of breath.	r=.338, p=.001*	r=.634, p=.0001*	r=.169, p=.111
	When I notice my heart beating rapidly, I worry that I might be having a heart attack.	r=.490, p=.0001*	r=.608, p=.0001*	r= -.480, p=.652
	Unusual body sensations scare me.	r=.506, p=.0001*	r=.625, p=.0001*	r=.730, p=.494
	When my stomach is upset, I worry that I might be seriously ill.	r=.468, p=.0001*	r=.640, p=.0001*	r=.001, p=.990
	It scares me when I am nauseous (sick stomach).	r=.294, p=.005**	r=.413, p=.0001*	r=.140, p=.188
Psychological (cognitive) concerns	It scares me when I feel shaky.	r=.65, p=.0001*	r=.650, p=.0001*	r=.158, p=.0001*
	When I cannot keep my mind on a task, I worry that I might be going crazy.	r=.675, p=.0001*	r=.675, p=.0001*	r=.207, p=.050**
	It scares me when I am unable to keep my mind on a task.	r=.444, p=.0001*	r=.444, p=.0001*	r=.214, p=.043**
	It scares me when I am nervous.	r=.67, p=.0001*	r=.670, p=.0001*	r=.102, p=.339
	When I am nervous, I worry that I might be mentally ill.	r=.775, p=.0001*	r=.775, p=.0001*	r=.117, p=.272
	Other people notice when I feel shaky.	r=.0691, p=.0001*	r=.691, p=.0001*	r=.138, p=.196
Social concerns	It is important to me to stay in control of my emotions.	r=.296, p=.005**	r=.273, p=.009	r=.782, p=.0001*
	It is important to not appear nervous.	r=.691, p=.0001*	r= -.52, p=.626	r=.674, p=.0001*
Scales				
Social		r=.169, p=.111	r=.238, p=.024**	
Physical			r=.714, p=.0001*	r=.169, p=.111
Psychological		r=.714, p=.0001*		r=.238, p=.024**

**Correlation was significant at .01 (1%) levels (2-tailed), * Correlation was significant at .05 levels (2-tailed)

Table 3. Analysis of varimax normalized

Items of ASI	Physical Concern	Psychological Concern	Social Concern
It is important to not appear nervous.	.727	.701	-.136
When I cannot keep my mind on a task, I worry that I might be going crazy.	.553	.383	.748
It scares me when I feel shaky	.474	.304	.788
It scares me when I feel faint.	.248	.481	.845
It is important to me to stay in control of my emotions.	.948	.694	.932
It scares me when my heart beats rapidly	.544	.665	.715
It embarrasses me when my stomach growls	.33	.596	.852
It scares me when I am nauseous (sick stomach).	.366	.623	.841
When I notice my heart beating rapidly, I worry that I might be having a heart attack.	.392	.573	.935
It scares me when I become short of breath.	.375	.587	.783
When my stomach is upset, I worry that I might be seriously ill.	.36	.577	.873
It scares me when I am unable to keep my mind on a task.	.848	.492	.883
Other people notice when I feel shaky.	.351	.379	.777
Unusual body sensations scare me.	.587	.713	.872
When I am nervous, I worry that I might be mentally ill.	.45	.278	.822
It scares me when I am nervous.	.541	.488	.809

Results from factor analysis revealed that the three aspects included in the ASI test were not distinct entities. The weigh load (Varimax Normalized) showed three factors sharing different items (item 1, item 5, item 6, item 12, item 14 and item 16). More than a quarter (1/4) of the items seemed to assess all three factors of ASI. This fact attested that there were interconnections between physical, psychological or cognitive and social aspects [39]. The participants who scored highly were considered to have anxiety symptoms. In the present sample, the t-test was computed to compare males and females on the

ASI-16 total scores and showed that there was no significant difference at 5% level [(Mean of males=29.3, Mean of females=29.57), t(26.176) at p=.000]. The ASI was supposed to be made up of three factors including physical, psychological and social and this research tended to evaluate if the results replicated this structure. The findings indicated an overlapping of physical, psychological and social aspects attesting that ASI is one-dimensional tool assessing anxiety symptoms (Table 2 and Table 3). The study had methodological limitations as the test-retest was not accomplished. The other limitation

was related to the sample used. A larger sample size was needed in order to construct the norms of ASI-16 on the entire Rwandan population.

Conclusion

The ASI-16 seemed to be reliable and valid on a non-psychiatric sample. The future researchers are recommended to determine the applicability of the ASI-16 with a psychiatric Rwandan sample. The other areas of forthcoming investigations include to validate the ASI on a sample of younger participants and also on the survivors of the 1994 genocide perpetrated against Tutsis and their offspring as the trans-generational transmission of trauma seems to be evidence attested. In addition, the current psychometric test should be validated on a larger sample of medical settings.

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