CrossMark

Assessment of Anxiety in Older Adults: Translation and Psychometric Evaluation of the German Version of the Geriatric Anxiety Scale (GAS)

Juliana Gottschling[1] · Daniel L. Segal[2] · Claudia Häusele[1] · Frank M. Spinath[1] · Gundula Stoll[1,3]

Abstract Anxiety occurs frequently among older adults, and can have deleterious impacts on the quality of daily life. Due to the dearth of well-validated elder-specific anxiety screening instruments available in the German language, this study aimed to translate the Geriatric Anxiety Scale (GAS), a reliable and valid 30-item self-report screening instrument for assessing anxiety based on DSM-IV-TR diagnostic criteria (Segal et al. *Journal of Anxiety Disorders, 24*(7), 709–714, 2010a), into German, and to validate the new measure. The German version of the GAS was developed through a translation and back translation process, with careful attention paid to culturally-sensitive expressions of anxiety in the German older adult population. The final version of the German GAS was tested in a sample of 242 community-dwelling older adults (M_{age}=72.0 years, SD=6.9 years; 59 % women) who completed either an online (26 %) or a paper-pencil (74 %) version of the questionnaire. The findings confirmed the successful translation of the GAS into German and provided psychometric support for the new measure. The validation of the factor structure based on confirmatory factor analyses was in support of a unidimensional structure of the GAS-G. Correlational analyses with inventories measuring anxiety related and non-anxiety related personality traits additionally confirmed the convergent and discriminant validity of the GAS for use as an assessment measure for anxiety among German older adults.

Keywords Anxiety · Aging · Assessment · Screening · GAS · Geriatric anxiety scale

Anxiety disorders are among the most prevalent mental disorders worldwide (Baxter et al. 2013; Kessler et al. 2007). Although anxiety disorders are reported to be less common than in young adults, they are also a widespread problem among older adults (Baxter et al. 2013; Gum et al. 2009). The prevalence of anxiety disorders among older adults is estimated to range from 1.2 to 15.0 % in community samples, and 1 to 28 % in clinical samples (Bryant et al. 2008). Moreover, subsyndromal anxiety symptoms in late life are even more prevalent, ranging between 15 to 52.3 % in community samples and 15 to 56 % in clinical samples (Bryant et al. 2008). In a representative sample of German older adults (70 to 103 years of age; *N*=516), Schaub and Linden (2000) reported a weighted overall prevalence of anxiety disorders of 4.5 %.

Clinically significant anxiety is associated with a variety of adverse outcomes such as poor physical health, sleep problems, or urinary incontinence (e.g., Mehta et al. 2003; Strine et al. 2005). Excessive anxiety causes considerable subjective distress, and is associated with a loss of physical activity, reduced life satisfaction, poor self-perceptions of health, and increased loneliness (Brenes et al. 2005; Wetherell et al. 2004). With regard to negative influencing factors, research has identified several risk factors that increase the likelihood of developing anxiety symptoms in late age, for instance, being female, living alone (compared to living in a relationship), having a lower education, scoring high on Neuroticism (Wolitzky-Taylor et al. 2010), as well as the experience of

✉ Juliana Gottschling
j.gottschling@mx.uni-saarland.de

[1] Department of Psychology, Saarland University, Campus A1 3, D-66123 Saarbruecken, Germany

[2] Department of Psychology, University of Colorado at Colorado Springs, Colorado Springs, CO, USA

[3] Present address: Hector Research Institute of Education Sciences and Psychology, University of Tuebingen, Tuebingen, Germany

stressful life events (e.g., Vink et al. 2009) and adverse events in childhood (Van Zelst et al. 2003). It has also been shown that people scoring high on anxiety also reported higher levels of dysfunctional coping (e.g., Coolidge et al. 2000). Furthermore, anxiety increases the risk for the onset of disability, even in high-functioning older adults (Seeman et al. 1995), and increases the risk of death by suicide (Allgulander and Lavori 1993).

In light of the advancing demographic shifts in Germany and much of the industrialized world (of Germany's current 80 million inhabitants, about 25.6 % are now 60 years old or older and by 2040, the percentage will increase to about 38.3 %; Statistisches Bundesamt 2013) and the high prevalence of anxiety and its associations to serious clinical outcomes, the necessity is great for assessment-tools that are specifically designed for older adults and that are well validated among older adult populations (Edelstein et al. 2008; Laidlaw and Pachana 2009).

The Assessment of Anxiety among Older Adults

The diagnosis and accurate assessment of anxiety in late life is especially challenging because of several complicating factors, including the co-occurrence of anxiety with medical conditions (Kogan et al. 2000) and psychiatric problems, such as depression or personality disorders (e.g., Cairney et al. 2008; Coolidge et al. 2000), higher rates of cognitive impairment among older adults (Seignourel et al. 2008; Wolitzky-Taylor et al. 2010; Yochim et al. 2013), and changes in life circumstances not faced by younger adults (Wolitzky-Taylor et al. 2010). Cognitive impairment requires special consideration when assessing anxiety in this age group as it may, for instance, influence the ability to communicate the experienced symptoms to a clinician as well as the presentation of the symptoms themselves (Therrien and Hunsley 2012).

Identification of anxiety in older adults is further complicated by the fact that many symptoms of anxiety can also occur as normal aspects of the aging process (e.g., muscle tension, hypervigilance, difficulty breathing) or as symptoms of a medical illnesses (Therrien and Hunsley 2012). For instance, many medical disorders that occur frequently among older adults (e.g., cardiovascular disease, respiratory disease, hyperthyroidism, and pulmonary difficulties) can involve symptoms that are also typical for anxiety, making it difficult to establish a differential diagnosis of these symptoms (Alwahhabi 2003; Kogan et al. 2000). In fact, besides limitations of the psychometric properties of measures not specifically designed for older adults, most anxiety measures are weighted heavily with somatic anxiety items, making it difficult to disentangle the symptoms of anxiety from symptoms of medical illnesses and aging in this population, and which may lead to inflated scores of anxiety in older people (see Yochim

et al. 2011). Nonetheless, somatic experiences are core aspects of many of the anxiety disorders and to exclude them would mean to ignore crucial symptoms of anxiety. Methods for assessing anxiety in older adults can therefore be enhanced through a careful inclusion of somatic content items that balance between the importance of somatic symptoms for diverse anxiety disorders and the high comorbidity with normal aspects of aging and physical illness.

In their comprehensive review of anxiety assessments in older adults, Therrien and Hunsley (2012) identified 91 different anxiety measures that were used in 213 scientific studies. However, of the 12 most commonly used measures, only three were especially developed for older adults and the majority of the used measures lacked sufficient evidence for their appropriateness in this age group (Therrien and Hunsley 2012). Among the most commonly used measures of anxiety is the Beck Anxiety Inventory (BAI; Beck et al. 1988), which is a 21-item self-report questionnaire designed to measure severity of anxiety. The BAI was originally developed for use with young and middle aged adults, and was not specifically normed for older adults. However, a number of studies have been conducted to evaluate its use with older populations. The internal consistency of BAI scores in clinical and community-dwelling samples of older adults is high ($\alpha=0.81–93$; Diefenbach et al. 2009; Kabacoff et al. 1997; Wetherell and Areán 1997; Wetherell and Gatz 2005), and the test-retest reliability was shown to be adequate (Diefenbach et al. 2009). Evidence for construct validity was confirmed by moderate correlations to other anxiety measures (Dennis et al. 2007; Diefenbach et al. 2009; Kabacoff et al. 1997; Wetherell and Gatz 2005). However, despite the initial evidence of psychometric properties of the BAI for use with older adults, a major drawback of the BAI is its high somatic item content (Therrien and Hunsley 2012). Indeed, 13 of the 21 items are related to somatic symptoms of anxiety that may be experienced by older adults for reasons more related to physical health conditions (i.e., wobbliness in one's legs, feeling dizzy/lightheaded, feeling unsteady, and difficulty breathing) than to anxiety.

There have been attempts to overcome these issues and to develop screening instruments specifically for older adults lately. For instance, the Geriatric Anxiety Inventory (GAI; Pachana et al. 2007) is a scale that exists in English and German. The GAI is a 20-item self-report measure that has demonstrated promising psychometric properties with older adults. The internal consistency of the GAI has been shown to be excellent in samples of community-dwelling older adults and older adults receiving psychiatric services (Andrew and Dulin 2007; Byrne et al. 2010; Pachana et al. 2007). Also, initial evidence for concurrent validity of the GAI was demonstrated by moderate to strong correlations with other anxiety measures (Diefenbach et al. 2009; Pachana et al. 2007). The GAI has a dichotomous yes/no response format in order

to provide an easy to use response format for mildly cognitively impaired older adults. However, it is an empirical question whether a dichotomous or a more differentiated response format is more useful for an identification of gradations of anxiety when used with community-dwelling older adults, many of whom do not have cognitive impairment.

One possible shortcoming of the GAI derives from the item selection process that was based on a large variety of other anxiety measures and was therefore not specific to symptoms of anxiety as described in diagnostic criteria of anxiety disorders. The originally 60 items were chosen to reflect the primary domains of anxiety covered in those inventories (e.g., fearfulness, worry, cognitions about anxiety, and anxiety sensitivity; Pachana et al. 2007). As a result, the 20-item GAI reflects anxiety symptomatology that appears to have a strong content emphasis on aspects of worrying. Subsequently the GAI puts less emphasis on other symptoms of anxiety, such as somatic aspects that often play, as already mentioned, a special role in older adult populations.

The Geriatric Anxiety Scale

The Geriatric Anxiety Scale (GAS; Segal et al. 2010a) is a self-report screening and assessment tool specifically designed for use with older adults. The GAS consists of 25 scorable items that assess experienced symptoms of anxiety and five additional items that assess different content areas of anxiety often reported to be of concern for older adults (fear of dying; fear of becoming a burden to family members; financial concerns; health concerns; concerns with regard to one's children). These latter five items are to be used clinically and as such are not included to the GAS total score (Segal et al. 2010a).

In contrast to other measures of anxiety, items on the GAS were created based on the full range of anxiety disorder symptoms included in the Diagnostic and Statistical Manual of Mental Disorders, (DSM-IV-TR; 4th Edition; American Psychiatric Association 2000). In the first phase of the development of the GAS, one item was crafted for each unique symptom of anxiety based on the formal diagnostic criteria. These original 57 items were then reduced in multiple steps to the current 25 (+5) item version, taking care to select such aspects of anxiety that are of particular salience for older adults (see Segal et al. 2010b). The scale contains three conceptually based domains that are typically assessed during clinical evaluation of anxiety (Segal et al. 2010a) and that tap into common components of anxiety: somatic (9 items), cognitive (8 items), and affective (8 items) symptoms (see Table 1). Special care was taken with regard to the construction and selection of the somatic items in order to strike a balance between the importance of somatic symptoms for an adequate assessment of anxiety and the avoidance of an over-

inclusion of somatic content in light of the aforementioned challenges when assessing anxiety in older populations. Therefore, the items of the somatic subscale were chosen to not include such physical symptoms of anxiety that are also typically experienced in older adults, independent of anxiety (e.g., trembling or difficulty breathing).

It is also important to note that somatic, cognitive, and affective symptoms of anxiety do not occur independently from each other, that is, individuals typically experience symptoms reflecting the full array of diversity of anxiety symptoms. In turn, the subscales of the GAS are assumed to be substantially correlated. Nevertheless, the feature of three different components of anxiety in addition to the GAS total score allows clinicians to easily determine which types of symptoms of anxiety are most urgent for a particular respondent. For instance, by examining the score of the somatic subscale in relation to the remaining two subscales and the total score, the clinician can potentially gauge whether a high anxiety score might be traced back to physical health problems instead of an anxiety disorder (Segal et al. 2010a). Furthermore, the scaling of the GAS from 0 (not at all) to 3 (all the time) allows users to indicate gradations of symptom severity, contributing further to the suitability of the GAS for practical use with older adults who do not have severe cognitive impairment. Individuals are asked to indicate how often they have experienced each symptom during the week before, with higher scores indicative of higher levels of anxiety.

Preliminary studies have suggested that the GAS has strong psychometric properties in clinical and community samples of older adults (Segal et al. 2010a; Yochim et al. 2011). In the initial validation study (Segal et al. 2010a), internal consistencies for the GAS total score and the three subscale scores were strong in a community sample (total score $\alpha=0.93$; Cognitive $\alpha=0.90$; Somatic $\alpha=0.80$; Affective $\alpha=0.82$) and a clinical sample (total score $\alpha=0.93$; Cognitive $\alpha=0.85$; Somatic $\alpha=0.80$; Affective $\alpha=0.82$). Convergent validity was demonstrated to other measures of anxiety, and it was further demonstrated that the GAS can detect clinically significant anxiety as assessed with the BAI (Yochim et al. 2011). The GAS also initially demonstrated discriminant validity, as shown by weak correlations with measures of reading ability and processing speed (Yochim et al. 2011). A recent study by Gould et al. (2014) compared the psychometric properties of the GAI and the GAS in a sample of 110 older adults. Both instruments showed good internal consistency, adequate reliability, and strong convergent validity, whereby both measures had strong associations to depression scores. However, these researchers reported somewhat decreased psychometric properties in participants with average delayed memory recall for both instruments (Gould et al. 2014).

With regard to the factor structure, a confirmatory factor analysis on the 25 GAS items in a US sample was in support

Table 1 Descriptive statistics of the German GAS

	Item #	N	M (SD)	Min-Max	SW	K
Somatic Subscale						
My heart raced or beat strongly.	1	238	0.29 (0.50)	0–2	1.41	0.99
My breath was short.	2	240	0.49 (0.70)	0–3	1.53	2.39
I had an upset stomach.	3	241	0.45 (0.67)	0–3	1.53	2.32
I had difficulty falling asleep.	8	240	0.73 (0.84)	0–3	1.06	0.52
I had difficulty staying asleep.*	9	239	1.06 (0.91)	0–3	0.52	−0.53
I had a hard time sitting still.	17	241	0.32 (0.56)	0–3	1.76	2.85
I felt tired.	21	240	0.97 (0.77)	0–3	0.65	0.36
My muscles were tense.	22	237	0.54 (0.67)	0–3	1.13	1.08
I had back pain, neck pain, or muscle cramps.	23	239	0.83 (0.75)	0–3	0.71	0.36
Cognitive Subscale						
I felt like things were not real or like I was outside of myself.	4	240	0.06 (0.26)	0–2	4.34	19.89
I felt like I was losing control.	5	240	0.14 (0.38)	0–2	2.79	7.51
I had difficulty concentrating.	12	240	0.53 (0.61)	0–3	0.95	0.98
I felt like I was in a daze.	16	241	0.16 (0.42)	0–3	3.05	11.47
I worried too much.	18	241	0.80 (0.79)	0–3	0.84	0.39
I could not control my worry.	19	240	0.39 (0.69)	0–3	1.89	3.24
I felt like I had no control over my life.	24	240	0.18 (0.49)	0–3	3.25	11.86
I felt like something terrible was going to happen to me.	25	239	0.15 (0.40)	0–2	2.78	7.45
Affective Subscale						
I was afraid of being judged by others.	6	239	0.27 (0.56)	0–3	2.39	6.78
I was afraid of being humiliated or embarrassed.	7	240	0.19 (0.43)	0–2	2.22	4.31
I was irritable.	10	240	0.62 (0.64)	0–3	0.84	0.96
I had outbursts of anger.	11	239	0.20 (0.45)	0–3	2.45	7.33
I was easily startled or upset.	13	240	0.39 (0.59)	0–3	1.48	2.39
I was less interested in doing something I typically enjoy.	14	241	0.49 (0.70)	0–3	1.52	2.46
I felt detached or isolated from others.	15	241	0.22 (0.45)	0–2	1.93	2.92
I felt restless, keyed up, or on edge.	20	240	0.48 (0.71)	0–3	1.43	1.58
Scale Statistics	Items total					
GAS-G total*	24	229	9.50 (8.10)	0–50	1.72	4.12
Somatic*	8	232	4.53 (3.31)	0–18	1.12	1.74
Cognitive	8	236	2.36 (2.83)	0–14	1.95	3.87
Affective	8	238	2.80 (3.05)	0–19	1.93	5.77

Participants rated the statements on a 4-point Likert-type scale ranging from 0 (not at all) to 3 (all the time)

M Mean, *SD* Standard Deviation, *SW* Skewness, *K* Kurtosis

*Item 9 removed based on results of the confirmatory factor analysis

of an unidimensional model of anxiety, which means that all GAS items appeared to tap into the same underlying latent construct (i.e., general anxiety; Mueller et al. 2015). The confirmed unidimensionality of the GAS is not surprising given the already mentioned co-occurrence of different aspects of anxiety. However, in light of these results, subscale scores should be interpreted with caution as they appear to be not distinguished well from each other. Initial derivation of cut-off scores for the GAS to indicate clinically significant anxiety were provided based on the US sample using receiver operating characteristic (ROC) analyses (Gould et al. 2014). The

presence or absence of a current anxiety disorder diagnosis derived by the Structured Clinical Interview for DSM-IV (SCID; First et al. 2002) was used as the dependent variable. A cut score of >16 was identified as optimal at the $p<0.01$ level based on an efficiency of 89 % (i.e., the percentage of correctly classified participants). However, a cut score of >9 was optimal with regard to sensitivity and specificity (Gould et al. 2014). These researchers concluded that the identification of a clinical cut score for the GAS will be beneficial for its usefulness in clinical settings, but needs to be clarified in larger clinical samples.

So far, the GAS has been translated into Persian (Bolghan-Abadi et al. 2013). In the Iranian validation sample, the Persian version of the GAS demonstrated promising psychometric properties in terms of internal reliability (total score $\alpha=0.92$; Cognitive $\alpha=0.81$; Somatic $\alpha=0.84$; Affective $\alpha=0.80$) and convergent validity. The confirmatory factor analyses reported in this study confirmed a single factor of anxiety. Furthermore, a recently developed 10-item short version of the GAS also showed promising psychometric properties (Mueller et al. 2015).

The Present Study

The current study consisted of three main purposes: (1) the translation of the GAS into German and the verification of the demonstrated unidimensionality in the original US sample by Mueller et al. (2015) in a German sample of community-dwelling older adults, (2) the exploration of preliminary psychometric properties in terms of reliability, validity, and utility of the German version of the GAS (GAS-G), and (3) the further examination of the GAS-G with regard to external criteria. To this end, participants with characteristics related to anxiety in older adults (i.e., female sex, lower level of education, not or no longer married, poor perceived health, experience of stressful life events) should obtain higher scores on the GAS-G than other participants.

Method

Participants

Participants were 242 community-dwelling German speaking older adults, who ranged in age from 60 to 90 years ($M_{age}=72.02$ years; SD=6.90 years; 59 % women). The average of years of education of the sample was 13.81 years (SD=3.27 years). Regarding their living situation, 77 participants reported living alone (31.8 %), 148 reported living with their partner (61.2 %), 7 reported living with other persons and/or relatives (2.9 %) and 7 reported living in an institution for older adults (2.9 %).

Procedure

Data Collection Participants were recruited from June 2013 to August 2013 either via announcements in different associations for older adults or by phone from a larger database of persons who had previously participated in scientific studies at Saarland University. In addition, participants were asked to invite other older persons who may be interested in participating. Participants were provided with a brief overview of the study and were given the option to use either a paper-and-pencil version (74 %) or an online version of the questionnaire

(26 %) in order to maximize the response rate. The comparability of the data of these methods for personality scales has been repeatedly demonstrated (e.g., Pettit 2002). In the present study, responses to the GAS-G did not differ by method nor were there significant differences between the subsamples with regard to gender, marital status, or educational background. However, participants in the online group were a little younger ($M_{age}=68.21$; SD=5.07) than participants in the paper pencil group ($M_{age}=73.36$; SD=6.96). Participation in this study was voluntary and all participants provided informed consent prior to their participation. The procedures, protocol, and informed consent in the present study were approved by the Institutional Review Board of Saarland University.

Translation of the GAS The German version of the GAS was developed through a translation and back translation process. In the first step, the 30 items of the GAS were translated from English into German by three psychologists independently. These translations were then reduced to one congruent version by double-checking all translated items with the criteria of anxiety disorders of the German DSM-IV-TR (Sass et al. 2003) and the International Statistical Classification of Diseases and Related Health Problems (ICD-10; Dilling et al. 2004). In case of differing translations, the version with the highest similarity to the DSM-IV-TR criteria was chosen. The items were then verified by a German specialist in geriatric psychology and by a clinically trained German psychologist with regard to their comprehensibility. In a following step, the final German items were back translated into English by a bilingual German psychologist. Finally, the original items and the back translated items were compared and reviewed by the developer of the English version of the GAS. This comparison revealed that the two measures showed a high concordance with each other.

Measures

In addition to the GAS-G, participants completed a demographic questionnaire containing information on participants' age, gender, ethnicity, marital status, years of education, living situation, and highest school degree. Measures were administered in the same order for all participants. Convergent validity was evaluated by correlations between the GAS-G and different measures of anxiety as well as constructs that significantly overlap with anxiety (i.e., Depression, Neuroticism, and maladaptive Coping). To confirm discriminant validity, correlations between the GAS-G and measures of separate constructs (i.e., the personality traits Extraversion, Conscientiousness, Agreeableness, and Openness, positive affectivity, and self-efficacy) were investigated. Additionally, information was obtained on stressful life events, health status, and satisfaction with one's own health. All measures in this study are commonly used in Germany in diverse clinical and non-clinical samples of adults.

Beck Anxiety-Inventory (BAI) The BAI (German version: Margraf and Ehlers 2007) is a well-established screening instrument measuring common symptoms of anxiety. The BAI consists of 21 self-report items and respondents are asked to indicate on a 4-point Likert-type scale ranging from 0 (not at all) to 3 (severely) the degree to which each symptom bothers them. The German version of the BAI was created in a translation and back translation process and demonstrated solid psychometric properties. Internal consistencies in clinical and non-clinical samples ranged between $\alpha=0.77$ and $\alpha=0.95$. The retest-reliability for an interval between 2 and 7 days was $r_{tt}=0.68$ and $r_{tt}=0.79$, respectively (Margraf and Ehlers 2007). Convergent and discriminant validity of the German BAI were demonstrated by correlations with other anxiety measures and external criteria (e.g., eating behavior, partnership satisfaction (Margraf and Ehlers 2007).

Big Five Inventory, Brief Version (BFI-K) The BFI-K (Rammstedt and John 2005) is a 21-item self-report inventory designed to measure the Big Five personality dimensions of Neuroticism, Extraversion, Openness, Conscientiousness, and Agreeableness. Participants are asked to respond on a 5-point Likert-type scale ranging from 1 (disagree strongly) to 5 (agree strongly). The scores of the subscales indicate the intensity of the characteristic of the respective personality trait. The BFI-K was developed as a short version of the 44-item BFI (John et al. 1991). The BFI was translated into German in a translation and back translation process and showed ample evidence of its psychometric properties. The 21 items of the BFI-K were selected from the 44 BFI items based on content validity and psychometric considerations (Rammstedt and John 2005). The theoretically assumed factor structure of the BFI-K was confirmed and the internal consistency of the subscales ranged from 0.59 to 0.93 (Rammstedt and John 2005). Construct validity and concurrent validity of the German version of the BFI and BFI-K was shown by correlations with other personality measures and external criteria (Lang et al. 2001; Rammstedt and John 2005).

Brief Symptom Inventory(BSI) The BSI (Derogatis 1993; Franke 2000) is a 53-item self-report symptom inventory designed to assess subjective impairment due to physical and especially psychological symptoms within nine primary symptom patterns of which Anxiety (6 items) and Depression (6 items) were used in the present study. There is no information about the translation process given in the manual. However, the BSI and the BSI-18 (which only contains the three subscales of Anxiety, Depression, and Somatization of the BSI; Derogatis 2000) have been successfully used in clinical and non-clinical samples of German adults. Each item is rated on a 5-point rating scale of distress (ranging from 0= not at all to 4=extremely). Internal consistencies of the Anxiety scale ranged between $\alpha=0.68$ to $\alpha=0.84$ and

between $\alpha=0.79$ and $\alpha=0.86$ for Depression (Franke 2000; Spitzer et al. 2011). Convergent validity was indicated by moderate to high correlations with similar dimensions. Also, patients scored significantly higher on Anxiety and Depression than did non-clinical samples which can be seen as evidence for criterion-related validity (Spitzer et al. 2011).

Coping Inventory for Stressful Situations (CISS-SF) The short version of the CISS (Cohan et al. 2006; Endler and Parker 1999) was used to measure maladaptive coping. The CISS-SF consists of 20 items using a 5-point Likert-type ranging from 1 (not at all) to 5 (very much). The maladaptive coping strategy Emotion-Oriented Coping is assessed with 7 items. The items used in the present study were developed for the German Twin Study on Personality and Well-Being (Spinath and Wolf 2006) in a translation and back translation process of the CISS. The CISS-SF had been shown to have good psychometric properties with internal consistencies ranging between $\alpha=0.79$ and $\alpha=0.88$ for the emotional subscale (Cohan et al. 2006) and correlations of the translated version with external criteria (anxiety, depression, personality) were generally in line with the original version and thus provide evidence for validity of the scale.

Positive and Negative Affect Schedule (PANAS) The PANAS (Watson et al. 1988; German version: Krohne et al. 1996) was used to measure positive affectivity. The PANAS consists of two 10-item mood scales: Positive Affect (PA) and Negative Affect (NA). Respondents are instructed to rate the extent to which they experienced each mood state during the past 12 months on a 5-point rating scale (from 1=very slightly or not at all to 5=extremely). Detailed information about the translation process is not given by the authors of the German version of the PANAS. The PA scale of the German version is highly internally consistent ($\alpha=0.84$; Krohne et al. 1996) and showed evidence of validity as indicated by associations with personality traits and measures of anxiety, emotions, and stress management (Krohne et al. 1996).

General Self-Efficacy (GSE) General Self-Efficacy was measured by the General Self-Efficacy (Schwarzer and Jerusalem 1995) scale which was originally developed in German and includes 10 items. The participants are asked to respond on a 4-point Likert-type scale ranging from 1 (not at all true) to 4 (exactly true). The GSE has been used in numerous studies, where it typically yielded internal consistencies between $\alpha=0.75$ and $\alpha=0.91$. Criterion-related validity is documented in numerous correlation studies where positive coefficients were found with favorable emotions, dispositional optimism, and work satisfaction. Negative coefficients were found with depression, anxiety, stress, burnout, and health complaints (Luszczynska et al. 2005).

Results

Descriptive Statistics and Preliminary Analyses

The descriptive statistics of all GAS-G items, arranged by the three subscales, are presented in Table 1. The means of the GAS-G items were relatively low with values ranging from 0.06 (item 4) to 1.06 (item 9). For items 1, 4, 5, 7, 15 and 25 participants did not use the whole range of the scale, which means that none of the participants reported having experienced these symptoms "all the time." All GAS-G items were positively skewed and showed a positive kurtosis, except for item 9. The skewness and kurtosis of six items (items 4, 5, 11, 16, 24 and 25) were especially high with values not in the acceptable range to assume their normality (West et al. 1995). Less than 3 % missing values appeared on each GAS-G item and Little's MCAR test (Little and Rubin 2002) indicated that the pattern of missing data in this study is not significantly biased.

Validation of the Factor Structure

The assumed unidimensionality of the GAS-G was examined by confirmatory factor analysis (CFA) based on raw data using Mplus 6 (Muthén and Muthén 1998). As the items of the GAS-G were rated using four response categories, they were modelled as categorical variables within Mplus. The extraction of the factors was conducted employing the mean and variance-adjusted robust weighted least squares (WLSMV) estimator on a polychoric correlation matrix. WLSMV is a robust estimator that does not assume normally distributed variables and that provides the best option for modeling categorical data (Brown 2006). In addition, a three factor CFA was conducted to compare the originally postulated three factor structure with a unidimensional model.

The goodness of fit of both models was determined according to different fit statistics as recommended by Kline (2011): The robust WLSMV χ^2, the Tucker-Lewis Index (TLI), the Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA). However, it should be noted that χ^2 values are inflated by large sample sizes (Kline 2011; Schermelleh-Engel et al. 2003). Values close to 0.06 for the RMSEA are indicative of a good fit, between 0.06 and 0.08 as moderate fit and values larger than 0.10 are indicative for a poor fit (Hu and Bentler 1999). For the CFI and TLI, values of 0.95 or above indicate a good fit, whereas values of 0.90 and <0.95 are taken as marginally acceptable fit (Hu and Bentler 1999).

The fit of the initial unidimensional model that loaded all 25 items onto a single latent factor of anxiety provided a borderline fit to the data, χ^2 (275)=701.28 (p=0.001), CFI= 0.918, TLI=0.911, and RMSEA=0.080. As in the US sample, the magnitude of the modification index between items 8 ("I

had difficulty falling asleep") and 9 ("I had difficulty staying asleep") was especially high, indicating additional covariance of both items after controlling for anxiety. Based upon the comparison with the US sample and the redundancy of item 8 and 9, it was decided to remove item 9 from the subsequent analysis. A subsequently conducted unidimensional CFA on the remaining 24 scorable GAS items revealed an acceptable fit to the data that was highly comparable the results found in the US sample, χ^2 (252)=571.51 (p=0.001), CFI=0.935, TLI=0.929, and RMSEA=0.072.

In addition, a three factor CFA of the 24 items that corresponds to the originally postulated three factor structure yielded a comparable fit to the data, χ^2 (249)=496.19 (p=0.001), CFI=0.950, TLI=0.944, and RMSEA=0.064. However, the correlation between the three subscales were substantial (ranging between 0.77 and 0.91) indicating that the three factors share a significant proportion of variance. As can be derived from Table 2, all factor loadings were substantial and significant in both models, largely exceeding 0.60.

Scale Intercorrelation and Internal Consistency

Table 3 presents the manifest rank-order correlations between the three subscales and the GAS-G total score. As expected, the three subscales were highly correlated, with r_S varying from 0.56 to 0.70 (p<0.001). The correlations between each subscale and the total score were even higher than these values (Somatic, r_S=0.89; Cognitive, r_S=0.85; Affective, r_S=0.81). The internal consistency estimates of reliability (Cronbach's alpha coefficient) was excellent for the total score (α=0.91). The reliabilities of the subscales were also high with values of α=0.83 for Affective, α=0.82 for Cognitive and α=0.75 for Somatic.

Convergent and Discriminant Validity

Table 3 also contains the convergent and discriminant correlations for the GAS-G. Spearman's rho revealed significant correlations with the anxiety scales of r_S=0.81 (p<0.001) with the BAI and of r_S=0.66 (p<0.001) with the BSI Anxiety scale. The GAS-G also showed high convergent validity with the BSI Depression scale (r_S=0.61; p<0.001) which corresponds to the high comorbidity among anxiety and depression. Also, the GAS-G is substantially correlated with Neuroticism (r_S=0.60; p<0.001) and Emotion-Oriented coping (r_S= 0.42; p<0.001). The discriminant correlations with the other subscales of the BFI-K, however, were rather low (ranging from r_S=−0.16 for Conscientiousness to r_S=−0.01 for Extraversion). For the remaining discriminant scales Spearman's rho revealed significant negative relationships of medium size (Positive Affect: r_S=−0.26; General Self-Efficacy: r_S=−0.36; p<0.001).

Table 2 Standardized and unstandardized coefficients for confirmatory factor analysis

Observed variable (scale)	One Factor			Three Factors		
	β	B	SE	β	B	SE
Somatic items						
… heart raced or beat strongly	0.51	1.00		0.56	1.00	
… breath was short	0.52	1.00	0.14	0.55	0.99	0.13
… had an upset stomach	0.62	1.21	0.17	0.67	1.20	0.17
… difficulty falling asleep	0.53	1.04	0.17	0.58	1.03	0.16
… hard time sitting still	0.50	0.96	0.17	0.53	0.95	0.17
… felt tired	0.66	1.29	0.20	0.71	1.27	0.19
… muscles were tense	0.69	1.35	0.21	0.76	1.35	0.20
… back pain, neck pain, or muscle cramps	0.52	1.01	0.16	0.56	1.00	0.15
Cognitive items						
… losing control	0.87	1.70	0.27	0.88	1.00	
… things were not real …	0.80	1.56	0.24	0.81	0.92	0.08
… difficulty concentrating	0.64	1.25	0.19	0.66	0.75	0.08
… like I was in a daze	0.68	1.34	0.21	0.70	0.80	0.08
… worried too much	0.80	1.58	0.23	0.82	0.94	0.07
… could not control my worry	0.83	1.64	0.22	0.85	0.97	0.09
… no control over my life	0.88	1.72	0.24	0.90	1.03	0.07
… something terrible was going to happen …	0.84	1.65	0.24	0.86	0.98	0.08
Affective items						
… afraid of being judged …	0.68	1.34	0.21	0.72	1.00	
… afraid of being humiliated …	0.72	1.41	0.22	0.75	1.05	0.09
… was irritable	0.87	1.71	0.23	0.90	1.23	0.10
… outbursts of anger	0.67	1.32	0.21	0.71	0.99	0.11
… easily startled or upset	0.86	1.68	0.24	0.88	1.23	0.10
… less interested in doing something …	0.75	1.47	0.21	0.79	1.11	0.10
… detached or isolated from others	0.57	1.12	0.20	0.60	0.84	0.11
… felt restless, keyed up, or on the edge	0.78	1.54	0.22	0.83	1.15	0.09

All loadings were significant ($p<.001$); S = Somatic, C = Cognitive, A = Affective.

Group Differences and External Criteria

To test whether the GAS-G is able to detect clinically significant anxiety, which would support the utility of the GAS-G, group differences in GAS-G total scores between participants with and without clinically significant symptoms of anxiety, as assessed with the BAI, were analyzed. Following the scoring guidelines for the BAI (Beck et al. 1988), participants with BAI scores of 8 or higher were classified as having mild ($n=43$), moderate ($n=21$) or severe ($n=8$) clinically significant symptoms of anxiety. Group differences on the GAS-G total score were analyzed using Mann–Whitney U-tests. Anxious participants scored significantly higher on the GAS-G than non-anxious participants ($Z=10.29$, $p<0.001$). The effect size of this group difference was large ($\varphi=0.69$). In addition, the cut-score of 16 provided by Gould et al. (2014) was slightly corrected to 15 due to the fewer items after removing item 9. Using this cut-score, 72.41 % of the participants with

moderate or severe symptoms of anxiety as assessed with the BAI were correctly identified (this corresponds to the percentage when using a cut-score of 16 in the 25 item version of the GAS-G).

To determine further evidence for the validity of the GAS-G, we explored whether participants with characteristics related to anxiety in older adults showed higher scores on the GAS-G total score than other participants. Based on the reported empirical findings, five external criteria were investigated: female sex, lower level of education (German 'Hauptschule' or no educational qualifications), being not married or no longer married, poor perceived health (compared to peers) and the experience of stressful life events (i.e., illness or death of a close person, divorce or unemployment) in the past two years.

As expected, women ($Z=2.83$, $p<0.01$) scored significantly higher than men on the GAS-G total score, and participants who experienced at least one stressful life event in the past two

Table 3 Internal consistency estimates, manifest interscale correlations of the GAS-G and GAS-G correlations with convergent and discriminant scales

		Spearman's rho			
	Cronbach's α	GAS-G total	S	C	A
GAS-G total	0.91				
Somatic (S)	0.75	0.89**			
Cognitive (C)	0.82	0.85**	0.65**		
Affective (A)	0.83	0.81**	0.54**	0.70**	
Convergent scales					
BAI	0.90	0.81**	0.77**	0.73**	0.61**
BSI-Anxiety	0.78	0.67**	0.54**	0.64**	0.62**
BSI-Depression	0.81	0.60**	0.47**	0.56**	0.59**
Emotion-oriented Coping	0.72	0.42**	0.26**	0.48**	0.44**
Neuroticism	0.75	0.60**	0.45**	0.62**	0.57**
Discriminant scales					
Extraversion	0.71	−0.03	0.03	0.00	−0.11
Openness	0.68	0.03	0.09	0.00	−0.01
Agreeableness	0.56	−0.14	−0.09	−0.04	−0.21**
Conscientiousness	0.61	−0.17*	−0.09	−0.18**	−0.20**
Positive Affect	0.91	−0.27**	−0.20**	−0.35**	−0.23**
General Self-Efficacy	0.93	−0.37**	−0.24**	−0.40**	−0.37**

N=242. S=Somatic subscale, C=Cognitive subscale; A=Affective Subscale

* *p*<0.05

** *p*<0.001

years (*Z*=3.35, *p*<0.001) scored significantly higher on the GAS-G total score than those who did not. The effect sizes of both group differences were small to medium (φ=0.19 and 0.22 respectively). Significantly higher GAS-G total scores were also obtained for participants with lower levels of education (*Z*=3.56, *p*<0.001) and for participants with poor perceived health (*Z*=3.87, *p*<0.001). Effect sizes of these group differences were small to medium (φ=0.24 and 0.26, respectively). No significant effect was found for being married vs. being not/or no longer married (*Z*=0.14, *p*=0.88).

Discussion

The purposes of this study were to translate the Geriatric Anxiety Scale into German, and to initially evaluate the psychometric properties of the new measure in a large sample of community-dwelling older German adults. Also, the reported unidimensionality of the GAS in the original US sample was verified and compared to the originally proposed three factor structure of the GAS using a CFA approach. Overall, results from the current study support the successful translation of the GAS into German and the effective use of the GAS-G as an assessment measure for anxiety among German older adults.

CFA analyses indicated a unidimensional factor structure of the GAS-G which is in line with results reported by Mueller et al. (2015) for the US sample. As in the US sample, the model fit was improved by the removal of item 9 ("I had difficulty staying asleep"). The three factor model yielded a comparable fit to the data; however, the high latent intercorrelations between the three factors indicated that all items tapped into the same unidimensional latent construct, that is, general anxiety. Moreover, the unidimensionality appears to be predominantly driven by cognitive items which support the argument that the factor represents anxiety and not normative aging. The results of the conducted CFA should also be interpreted in light of the development and purpose of the GAS (see Segal et al. 2010a), as with regard to its practical usefulness. An important objective in developing the GAS was to provide a brief screening instrument that captures the broad range of anxiety disorder symptoms as delineated in the DSM-IV-TR and to construct three conceptually different, yet related, scales that are of practical relevance in a clinical evaluation process of anxiety, namely the Somatic, Affective, and Cognitive subscales. Therefore, the relatively high intercorrelation of the scales, which especially occurred between the Cognitive and Affective subscales, is not surprising and can be traced back to the fact that symptoms of anxiety disorders described in the DSM-IV-TR are often comorbid with each other (Sass et al. 2003). With respect to the somatic item content, special care was taken to find a balance between an avoidance of an over-inclusion of somatic experiences (as they might be comorbid with physical illness) and the importance of somatic symptoms for diverse anxiety disorders.

A general guideline for practical use of the GAS-G is to compute the total score of the 24 items (without item 9) as a first screening. If individuals score higher than 15, which can be seen as a tentative cut-score, the clinician may use the subscores of the three scales to derive hypotheses about the specific kinds of anxiety symptoms that are most frequently experienced and might therefore be a focus in treatment. Moreover, if the score of the somatic subscales is especially high in comparison to the other two scales, clinicians and researchers should further examine the extent to which the endorsed somatic symptoms are due to anxiety, medical illness, or a combination of both (Segal et al. 2010a). The GAS-G may also be especially useful for clinicians because it includes five content areas that provide clinicians and researchers with information about specific domains of concern (e.g., finances, becoming a burden to others) that may be a source of anxiety and that may be targeted more thoroughly.

With regard to the psychometric properties of the GAS-G, the reported results were strongly in support of the internal consistency and the validity of the translated scale. Cronbach's alpha coefficients of the manifest scales were substantial and similar to those reported for the English version (Segal et al. 2010a; Yochim et al. 2013) and the Persian version (Bolghan-Abadi et al. 2013). Convergent validity of the GAS-G was evidenced via significant correlations between the GAS-G total score and two other measures of anxiety as well as depression, whereby the relation between the GAS-G total score and depression was lower than the correlation with both anxiety measures. Researchers have attempted to explain the comorbidity with a partly overlapping psychological and neurological basis of anxiety and depression (Teachman et al. 2007). Others have argued that there might exist a unitary factor of "distress" that comprises mixed anxiety and depression among older adults (Meeks et al. 2003). As a consequence, the diagnostic criteria of both disorders do overlap to some degree. The substantial correlation of the GAS-G with depression ($r_S = 0.61$) indicates a significant overlap between both constructs, a fact that could be considered as a potential confound in the screening for anxiety in later life, but as noted elsewhere (Segal et al. 2010a, b), depression and anxiety often co-occur among younger and older adults. Also, the obtained pattern of a strong relationship between the GAS-G total score and depression is not unique to the GAS-G and also occurred between the BAI, which even explicitly excludes symptoms of depression ($r_S = 0.55$), and BSI Anxiety ($r_S = 0.57$). Further support of the convergent validity can be derived from the obtained correlations between the GAS-G total score and measures of anxiety related constructs, specifically Emotion-Oriented coping, and Neuroticism. As expected, the relationships were substantial in the hypothesized directions, but lower than the relationship of the GAS-G to the BAI, BSI Anxiety and BSI Depression. Notably, the Somatic scale of the GAS-G showed the lowest correlations with maladaptive coping and with Neuroticism suggesting that somatic symptoms did not predominantly account for the convergence of the scales.

With respect to the discriminant validity of the GAS-G, our findings confirmed the expected low relationships with measures of constructs that are non-related (i.e., Extraversion, Openness, Agreeableness, Conscientiousness), or negatively related (i.e., Positive Affect, General Self-Efficacy) to anxiety. The reported finding, that individuals with clinically significant anxiety had higher GAS-G total scores, can be interpreted in support of the practical utility of the GAS-G in detecting clinically significant anxiety. According to group differences, being female, experiencing stressful life events, having a lower education, and perceiving a lower health compared to other persons in the same age was accompanied by higher reports of anxiety. Solely married participants and participants being not or no longer married did not show a meaningful difference in their mean scores of the GAS-G, which is in contrast to findings reported, for example, by Schaub and Linden (2000). However, this could, in part, be due to the characteristics of the present sample, as the majority of individuals did not live alone, even when they were not in a relationship.

Apart from the evaluation of the psychometric properties of the GAS-G, this study also raised some further points of discussion that should be addressed. First, the reported data set was based on community-dwelling older adults from one geographical region. The psychometric properties of the GAS-G should additionally be examined in more diverse samples and in clinical samples in Germany, which becomes especially important to further confirm the cut-score of 15. The relatively low means and the non-normality of most of the items within this sample indicated that the participants experienced symptoms of anxiety rather infrequently. However, this pattern is not surprising given the fact that the sample consisted of community-dwelling older adults without clinically diagnosed anxiety and against the background of the high educational level in the German sample.

The low means in the German sample (M=10.51, SD=8.95) should also be interpreted in comparison to the US (M=13.65, SD=9.70) and the Iranian sample (M=18.94, SD=12.65) where it becomes obvious that the mean scores in both western society samples were considerably lower than in the Iranian sample. This pattern is in accordance with the higher prevalence of anxiety among Iranian adults (21 %; Noorbala et al. 2004), compared to adults in Germany (4.5 %; Schaub and Linden 2000) or the US (between 3 and 14 %; Bryant et al. 2008; Wolitzky-Taylor et al. 2010). It might also be the case that the prevalence rates are especially low in Germany (compared to the overall values of Europe; see Baxter et al. 2013) because of a perceived economic and social security in Germany especially for older adults (i.e., relatively secure pensions provided by the government). In this same vein, a recent study reported higher worry scores in an American sample compared to a German sample (Babcock et al. 2012). It would be interesting to further

investigate potential cultural difference with regard to the prevalence and occurrence of anxiety in later life, especially in a study utilizing the same anxiety measure in different samples.

Future studies should also examine test-retest reliability of the GAS-G to further support the reliability of the measure. Another important aspect for research is to examine the potential moderating effect of cognitive impairment on the psychometric properties of the GAS-G. In cases of significant cognitive impairment in respondents, for example in nursing home settings, a more simple yes/no response format may prevent misunderstandings, but this is an empirical issue that should be addressed. Finally, the high inter-correlation of the items opens the opportunity for a short version of the GAS-G, as already demonstrated for the English version by Mueller et al. (2015), to provide an even briefer screening instrument of anxiety among older adults.

In conclusion, the impetus of this study was to translate a measure of anxiety that was specifically designed for use with older adults and that resolved several disadvantages of former measures into German, and to initially evaluate the psychometric properties of this new scale. The results of the present study provided solid evidence for a successful translation of the GAS and the new measure proved to be highly reliable and valid. The reported findings provide promising evidence for reliability of the GAS-G, its convergent and discriminant validity, and its ability to detect clinically relevant anxiety. Also, with regard to external criteria, the GAS-G by and large discriminated between participants with and without anxiety related characteristics. Conclusions about the overall anxiety of an individual, however, should be drawn based on the total score whereas the three subscales can provide further information on the specifically relevant aspects of anxiety for a specific person. Further research on the GAS-G certainly seems warranted, as well as translations of the GAS into other languages.

progress through the editorial review process, the content of the reviews, and any revisions made.

Supplement

German GAS Items

Wie häufig haben Sie die folgenden Symptome (in der letzten Woche) erlebt?

1) Ich hatte Herzrasen oder starkes Herzklopfen.
2) Ich war kurzatmig.
3) Ich hatte einen empfindlichen oder nervösen Magen.
4) Ich hatte das Gefühl, dass Dinge unwirklich waren oder dass ich von meinem Körper losgelöst war.
5) Ich hatte das Gefühl, die Kontrolle zu verlieren.
6) Ich hatte Angst, von anderen bewertet oder beurteilt zu werden.
7) Ich hatte Angst, gedemütigt oder bloßgestellt zu werden.
8) Ich hatte Schwierigkeiten einzuschlafen.
9) Ich hatte Schwierigkeiten durchzuschlafen.
10) Ich war leicht reizbar.
11) Ich hatte Wutausbrüche.
12) Ich hatte Schwierigkeiten, mich zu konzentrieren.
13) Ich war schnell irritiert oder aufgebracht.
14) Ich hatte weniger Interesse daran, Dinge zu tun, die mir sonst Freude bereiten.
15) Ich fühlte mich von anderen isoliert und ausgeschlossen.
16) Ich fühlte mich benommen oder wie im Nebel.
17) Es fiel mir schwer, still zu sitzen.
18) Ich habe mir zu viele Sorgen gemacht.
19) Ich konnte meine Sorgen nicht im Zaum halten.
20) Ich fühlte mich ruhelos, angespannt und ständig "auf dem Sprung".
21) Ich fühlte mich müde.
22) Meine Muskeln waren angespannt.
23) Ich hatte Rückenschmerzen, Nackenschmerzen oder Muskelkrämpfe.
24) Ich hatte das Gefühl, keine Kontrolle über mein Leben zu haben.
25) Ich hatte das Gefühl, dass mir etwas Schreckliches widerfahren würde.
26) Ich war wegen meiner finanziellen Lage in Sorge.
27) Ich war wegen meiner gesundheitlichen Verfassung in Sorge.
28) Ich war wegen meiner Kinder in Sorge.
29) Ich hatte Angst vor dem Sterben.
30) Ich hatte Angst, zu einer Belastung für meine Familie oder Kinder zu werden.

References

Allgulander, C., & Lavori, P. W. (1993). Causes of death among 936 elderly patients with "pure" anxiety neurosis in Stockholm County, Sweden, and in patients with depressive neurosis or both diagnoses. *Comprehensive Psychiatry, 34*(5), 299–302.

Alwahhabi, F. (2003). Anxiety symptoms and generalized anxiety disorder in the elderly: a review. *Harvard Review of Psychiatry, 11*(4), 180–193.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.). Arlington: American Psychiatric Publishing.

Andrew, D. H., & Dulin, P. L. (2007). The relationship between self-reported health and mental health problems among older adults in New Zealand: experiential avoidance as a moderator. *Aging & Mental Health, 11*(5), 596–603.

Babcock, R. L., MaloneBeach, E. E., Hou, B., & Smith, M. (2012). The experience of worry among young and older adults in the United States and Germany: a cross-national comparison. *Aging & Mental Health, 16*(4), 413–422.

Baxter, A. J., Scott, K. M., Vos, T., & Whiteford, H. A. (2013). Global prevalence of anxiety disorders: a systematic review and meta-regression. *Psychological Medicine, 43*(05), 897–910.

Beck, A. T., Steer, R. A., & Carbin, M. G. (1988). Psychometric properties of the Beck Depression Inventory: twenty-five years of evaluation. *Clinical Psychology Review, 8*(1), 77–100.

Bolghan-Abadi, M., Segal, D. L., Coolidge, F. L., & Gottschling, J. (2013). Persian version of the Geriatric Anxiety Scale: translation and preliminary psychometric properties among Iranian older adults. *Aging & Mental Health, 17*(7), 896–900.

Brenes, G. A., Guralnik, J. M., Williamson, J. D., Fried, L. P., Simpson, C., Simonsick, E. M., & Penninx, B. W. J. H. (2005). The influence of anxiety on the progression of disability. *Journal of the American Geriatrics Society, 53*(1), 34–39.

Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York: Guilford Press.

Bryant, C., Jackson, H., & Ames, D. (2008). The prevalence of anxiety in older adults: methodological issues and a review of the literature. *Journal of Affective Disorders, 109*(3), 233–250.

Byrne, G. J., Pachana, N. A., Goncalves, D. C., Arnold, E., King, R., & Khoo, S. K. (2010). Psychometric properties and health correlates of the Geriatric Anxiety Inventory in Australian community-residing older women. *Aging & Mental Health, 14*(3), 247–254.

Cairney, J., Corna, L. M., Veldhuizen, S., Herrmann, N., & Streiner, D. L. (2008). Comorbid depression and anxiety in later life: patterns of association, subjective well-being, and impairment. *The American Journal of Geriatric Psychiatry, 16*(3), 201–208.

Cohan, S. L., Jang, K. L., & Stein, M. B. (2006). Confirmatory factor analysis of a short form of the Coping Inventory for Stressful Situations. *Journal of Clinical Psychology, 62*(3), 273–283.

Coolidge, F. L., Segal, D. L., Hook, J. N., & Stewart, S. (2000). Personality disorders and coping among anxious older adults. *Journal of Anxiety Disorders, 14*(2), 157–172.

Dennis, R. E., Boddington, S. J. A., & Funnell, N. J. (2007). Self-report measures of anxiety: are they suitable for older adults? *Aging & Mental Health, 11*(6), 668–677.

Derogatis, L. R. (1993). *The Brief Symptom Inventory (BSI): Administration, scoring and procedures manual* (3rd ed.). Minneapolis: National Computer Systems, Inc. Retrieved from https://www.statisticssolutions.com/brief-symptom-inventory-bsi/

Derogatis, L. R. (2000). *BSI-18: Brief Symptom Inventory 18 – Administration, scoring, and procedures manual*. Minneapolis: Pearson.

Diefenbach, G. J., Tolin, D. F., Meunier, S. A., & Gilliam, C. M. (2009). Assessment of anxiety in older home care recipients. *The Gerontologist, 49*(2), 141–153.

Dilling, H., Mombour, W., Schmidt, M. H., & Schulte-Markwort, E. (2004). *Internationale Klassifikation psychischer Störungen: ICD-10 Kapitel V [International Classification of mental disorders: ICD-10 Chapter V]* (5th ed.). Bern: Huber.

Edelstein, B. A., Woodhead, E. L., Segal, D. L., Heisel, M. J., Bower, E. H., Lowery, A. J., & Stoner, S. A. (2008). Older adult psychological assessment: current instrument status and related considerations. *Clinical Gerontologist, 31*(3), 1–35.

Endler, N. S., & Parker, J. D. A. (1999). Coping Inventory for Stressful Situations (CISS): Manual. Multi-Health Systems.

First, M., Spitzer, R., Gibbon, M., & Williams, J. (2002). *Structured clinical interview for DSM-IV-TR Axis I Disorders, research version*. New York: New York State Psychiatric Institute.

Franke, G. H. (2000). *BSI. Brief Symptom Inventory – Deutsche Version. Manual.*. Beltz: Göttingen.

Gould, C. E., Segal, D. L., Yochim, B. P., Pachana, N. A., Byrne, G. J., & Beaudreau, S. A. (2014). Measuring anxiety in late life: a psychometric examination of the Geriatric Anxiety Inventory and Geriatric Anxiety Scale. *Journal of Anxiety Disorders, 28*(8), 804–811.

Gum, A. M., King-Kallimanis, B., & Kohn, R. (2009). Prevalence of mood, anxiety, and substance-abuse disorders for older Americans in the national comorbidity survey-replication. *The American Journal of Geriatric Psychiatry: Official Journal of the American Association for Geriatric Psychiatry, 17*(9), 769–781.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1–55.

John, O. P., Donahue, E. M., & Kentle, R. L. (1991). *The big five inventory: Versions 4a and 54*. Berkeley: University of California, Institute of Personality and Social Research.

Kabacoff, R. I., Segal, D. L., Hersen, M., & Van Hasselt, V. B. (1997). Psychometric properties and diagnostic utility of the Beck Anxiety Inventory and the State-Trait Anxiety Inventory with older adult psychiatric outpatients. *Journal of Anxiety Disorders, 11*(1), 33–47.

Kessler, R. C., Amminger, G. P., Aguilar-Gaxiola, S., Alonso, J., Lee, S., & Ustun, T. B. (2007). Age of onset of mental disorders: a review of recent literature. *Current Opinion in Psychiatry, 20*(4), 359–364.

Kline, R. B. (2011). *Principles and practice of structural equation modeling*. New York: Guilford Press.

Kogan, J. N., Edelstein, B. A., & McKee, D. R. (2000). Assessment of anxiety in older adults: current status. *Journal of Anxiety Disorders, 14*(2), 109–132.

Krohne, H. W., Egloff, B., Kohlmann, C.-W., & Tausch, A. (1996). Untersuchungen mit einer deutschen Version der "Positive and Negative Affect Schedule"(PANAS) [Studies with a German version of the "Positive and Negative Affect Schedule"(PANAS)]. *Diagnostica, 42*, 139–156.

Laidlaw, K., & Pachana, N. A. (2009). Aging, mental health, and demographic change: challenges for psychotherapists. *Professional Psychology: Research and Practice, 40*(6), 601–608.

Lang, F. R., Lüdtke, O., & Asendorpf, J. B. (2001). Testgüte und psychometrische Äquivalenz der deutschen Version des Big Five Inventory (BFI) bei jungen, mittelalten und alten Erwachsenen [Test quality and equivalence of the German version of the Big Five Inventory (BFI) with young, middle-old and old adults]. *Diagnostica, 47*(3), 111–121.

Little, R. J. A., & Rubin, D. B. (2002). *Statistical analysis with missing data*. Hoboken: Wiley.

Luszczynska, A., Scholz, U., & Schwarzer, R. (2005). The general self-efficacy scale: multicultural validation studies. *Journal of Psychology: Interdisciplinary and Applied, 139*(5), 439–457.

Margraf, J., & Ehlers, A. (2007). *Beck-Angst-Inventar (BAI) Manual. [The Beck Anxiety Inventory (BAI), Manual]*. Frankfurt am Main: Hardcourt Test Services GmbH.

Meeks, S., Woodruff-Borden, J., & Depp, C. A. (2003). Structural differentiation of self-reported depression and anxiety in late life. *Journal of Anxiety Disorders, 17*(6), 627–646.

Mehta, K. M., Simonsick, E. M., Penninx, B. W. J. H., Schulz, R., Rubin, S. M., Satterfield, S., & Yaffe, K. (2003). Prevalence and correlates of anxiety symptoms in well-functioning older adults: findings from the health aging and body composition study. *Journal of the American Geriatrics Society, 51*(4), 499–504.

Mueller, A. E., Segal, D. L., Gavett, B., Marty, M. A., Yochim, B., June, A., & Coolidge, F. L. (2015). Geriatric Anxiety Scale: item response theory analysis, differential item functioning, and creation of a ten-item short form (GAS-10). *International Psychogeriatrics, 27*, 1099–1111.

Muthén, L. K., & Muthén, B. O. (1998). *Mplus: Statistical analysis with latent variables (Version 6)*. Los Angeles: Authors.

Noorbala, A. A., Bagheri Yazdi, S. A., Yasamy, M. T., & Mohammad, K. (2004). Mental health survey of the adult population in Iran. *The British Journal of Psychiatry, 184*, 70–73.

Pachana, N. A., Byrne, G. J., Siddle, H., Koloski, N., Harley, E., & Arnold, E. (2007). Development and validation of the Geriatric Anxiety Inventory. *International Psychogeriatrics, 19*(1), 103–114.

Pettit, F. A. (2002). A comparison of World-Wide Web and paper-and-pencil personality questionnaires. *Behavior Research Methods, Instruments, & Computers: A Journal of the Psychonomic Society, Inc, 34*(1), 50–54.

Rammstedt, B., & John, O. P. (2005). Kurzversion des Big Five Inventory (BFI-K) [Short version of the Big Five Inventory, BFI-K]. *Diagnostica, 51*(4), 195–206.

Sass, H., Wittchen, H. U., Zaudig, M., & Houben, I. (2003). *Diagnostisches und Statistisches Manual Psychischer Störungen DSM-IV-TR: Textrevision [Diagnostic and Statistical Manual of Mental Disorders DSM-IV-TR: Revised text]*. Göttingen: Hogrefe Verlag.

Schaub, R. T., & Linden, M. (2000). Anxiety and anxiety disorders in the old and very old - Results from the Berlin Aging Study (BASE). *Comprehensive Psychiatry, 41*(2), 48–54.

Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: tests of significance and descriptive goodness-of-fit measures. *MPR-Online, 8*(2), 23–74.

Schwarzer, R., & Jerusalem, M. (1995). Generalized self-efficacy scale. In J. Weinman & S. Wright (Eds.), *Measures in health psychology: A user's portfolio. Causal and control beliefs* (pp. 35–37). Windsor: NFER-NELSON.

Seeman, T. E., Berkman, L. F., Charpentier, P. A., Blazer, D. G., Albert, M. S., & Tinetti, M. E. (1995). Behavioral and psychosocial predictors of physical performance: MacArthur studies of successful aging. *The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences, 50*(4), 177–183.

Segal, D. L., June, A., Payne, M., Coolidge, F. L., & Yochim, B. (2010a). Development and initial validation of a self-report assessment tool for anxiety among older adults: the Geriatric Anxiety Scale. *Journal of Anxiety Disorders, 24*(7), 709–714.

Segal, D. L., Qualls, S. H., & Smyer, M. A. (2010b). *Aging and mental health* (2nd ed.). Chichester: Wiley-Blackwell.

Seignourel, P. J., Kunik, M. E., Snow, L., Wilson, N., & Stanley, M. (2008). Anxiety in dementia. *Clinical Psychology Review, 28*(7), 1071–1082.

Spinath, F. M., & Wolf, H. (2006). CoSMoS and TwinPaW: initial report on two new German twin studies. *Twin Research and Human Genetics, 9*(6), 787–790.

Spitzer, C., Hammer, S., Löwe, B., Grabe, H., Barnow, S., Rose, M., et al. (2011). Die Kurzform des Brief Symptom Inventory (BSI-18): Erste Befunde zu den psychometrischen Kennwerten der deutschen Version [The short version of the Brief Symptom Inventory (BSI-18): Initial results of the psychometric properties of the German version]. *Fortschritte der Neurologie Psychiatrie, 79*(09), 517–523.

Statistisches Bundesamt. (2013). *Statistisches Jahrbuch 2013*. "*Deutschland und Internationales*" *[Statistical Yearbook 2013]*. Wiesbaden: Statistisches Bundesamt.

Strine, T. W., Chapman, D. P., Kobau, R., & Balluz, L. (2005). Associations of self-reported anxiety symptoms with health-related quality of life and health behaviors. *Social Psychiatry and Psychiatric Epidemiology, 40*(6), 432–438.

Teachman, B. A., Siedlecki, K. L., & Magee, J. C. (2007). Aging and symptoms of anxiety and depression: structural invariance of the tripartite model. *Psychology and Aging, 22*(1), 160–170.

Therrien, Z., & Hunsley, J. (2012). Assessment of anxiety in older adults: a systematic review of commonly used measures. *Aging & Mental Health, 16*(1), 1–16.

Van Zelst, W. H., de Beurs, E., Beekman, A. T. F., Deeg, D. J. H., & van Dyck, R. (2003). Prevalence and risk factors of posttraumatic stress disorder in older adults. *Psychotherapy and Psychosomatics, 72*(6), 333–342.

Vink, D., Aartsen, M. J., Comijs, H. C., Heymans, M. W., Penninx, B. W. J. H., Stek, M. L., et al. (2009). Onset of anxiety and depression in the aging population: comparison of risk factors in a 9-year prospective study. *The American Journal of Geriatric Psychiatry, 17*(8), 642–652.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063–1070.

West, S. G., Finch, J. F., & Curran, P. J. (1995). Structural equation models with nonnormal variables: Problems and remedies. In R. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp. 56–75). Thousand Oaks: SAGE Publications, Inc.

Wetherell, J. L., & Areán, P. A. (1997). Psychometric evaluation of the Beck Anxiety Inventory with older medical patients. *Psychological Assessment, 9*(2), 136–144.

Wetherell, J. L., & Gatz, M. (2005). The Beck Anxiety Inventory in older adults with generalized anxiety disorder. *Journal of Psychopathology and Behavioral Assessment, 27*(1), 17–24.

Wetherell, J. L., Thorp, S. R., Patterson, T. L., Golshan, S., Jeste, D. V., & Gatz, M. (2004). Quality of life in geriatric generalized anxiety disorder: a preliminary investigation. *Journal of Psychiatric Research, 38*(3), 305–312.

Wolitzky-Taylor, K. B., Castriotta, N., Lenze, E. J., Stanley, M. A., & Craske, M. G. (2010). Anxiety disorders in older adults: a comprehensive review. *Depression and Anxiety, 27*(2), 190–211.

Yochim, B. P., Mueller, A. E., June, A., & Segal, D. L. (2011). Psychometric properties of the Geriatric Anxiety Scale: comparison to the Beck Anxiety Inventory and Geriatric Anxiety Inventory. *Clinical Gerontologist, 34*(1), 21–33.

Yochim, B. P., Mueller, A. E., & Segal, D. L. (2013). Late life anxiety is associated with decreased memory and executive functioning in community dwelling older adults. *Journal of Anxiety Disorders, 27*(6), 567–575.