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Do Relationships Exist Between Age, Gender, and Education and Self-Reports of Anxiety Among Older Adults?

Patricia A. Lowe*
University of Kansas
Cecil R. Reynolds
Texas A&M University

ABSTRACT - The present study examined the test score performance of 394 non-referred older adults on the Adult Manifest Anxiety Scale-Elderly Version (AMAS-E; Reynolds, Richmond, &Lowe 2003c) to determine if demographic variables (i.e., age, gender, and education) are related to test score performance. Results of a Multivariate Analysis of Variance (MANOVA) and follow-up Analyses of Variance (ANOVAs) as well as two ANOVAs revealed that females and individuals with 7-12 years of education consistently reported higher levels of anxiety relative to males and individuals with 13-16 years of education on the Total Anxiety scale and the three anxiety subscales (i.e., Worry/Oversensitivity, Fear of Aging, and Physiological Anxiety). The only age difference to emerge was on the Physiological Anxiety subscale in which individuals in the 75-83 and 84-100 age groups reported higher levels of physiological anxiety in comparison to the 60-74 age group. These findings are relatively consistent with the studies examining the relationships between these different demographic variables and anxiety test scores at younger ages and suggest that the AMAS-E scores, as well as scores on other measures of anxiety, be interpreted within the context of an individual's gender, education, and age.

As the U.S. population ages, more attention is being devoted to older adults and older adults' mental health needs (Stanley & Beck, 2000), including older adults who experience a variety of anxiety complaints. Byrnes (2001) reported that approximately 20% of the older adult population experiences some symptoms of anxiety. Despite the high prevalence rate of anxiety symptoms, limited research is available on the assessment (e.g., Kogan, Edelstein, McKee,

**Patricia A. Lowe; 634 JRP Hall; 1122 W.Campus Road; University of Kansas Lawrence, Kansas; tlowe@ku.edu (email).*

2000) and treatment of anxiety in the senior population (e.g., Stanley, Beck, & Zebb, 1996).

Assessment of anxiety usually involves a variety of measures such as clinician-administered interviews, behavioral rating scales, behavioral observations, psychophysiological assessment, and self-report instruments. Self-report is a frequent and effective means of assessing anxiety (James, Reynolds, & Dunbar, 1994). However, few self-report instruments exist that were designed specifically to assess anxiety in the older adult population (i.e., items selected based on older adults' responses, scales developed based on factor analysis of older adults' responses, and availability of older adult norms). Most self-report measures of anxiety were designed for younger populations and the experience and presentation of anxiety in these younger populations may be somewhat different than in the older adult population (see Kogan et al., 2000; Lowe, 2001; Lowe & Reynolds, 2000; Lowe & Reynolds, in press; Reynolds, Richmond, & Lowe, 2003d). Thus, self-report measures of anxiety designed for specific age groups would be needed, including self-report measures designed specifically for the senior population.

A recent and promising self-rated scale uniquely designed to assess chronic, manifest anxiety in the older adult population is the Adult Manifest Anxiety Scale-Elderly Version (AMAS-E; Reynolds, Richmond, & Lowe, 2003c). The term chronic, manifest anxiety developed out of a trait theory of general anxiety (Reynolds, 1985) and is viewed as a measure of drive or motivation (see Taylor, 1951, 1953 for a discussion). The AMAS-E is a 44-item self-report measure used to assess the level and nature of chronic, manifest anxiety in older adults. The AMAS-E consists of three anxiety subscales: Worry/Oversensitivity, Fear of Aging, and Physiological Anxiety, and a Lie scale, which provides a measure of social desirability. In addition, the AMAS-E has a Total Anxiety scale score, which provides a global measure of chronic, manifest anxiety and is the sum of the three anxiety subscale scores (Reynolds, Richmond, & Lowe, 2003d). The AMAS-E's three-factor structure of anxiety is consistent with other measures of chronic, manifest anxiety, for example, the Revised Children's Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1978), the Children's Manifest Anxiety Scale (CMAS; Castaneda, McCandless, & Palermo, 1956), and the Adult Manifest Anxiety Scale-Adult Version (AMAS-A; Reynolds, Richmond, & Lowe, 2003a), and is also consistent with multidimensional theories of anxiety (e.g., Cattell & Scheier, 1961; Endler, Edwards, & Vitelli, 1991; Spielberger, 1966).

The AMAS-E is an upward extension of the RCMAS. The RCMAS is a revised version of the CMAS, the CMAS is a modified version of Taylor's Manifest Anxiety Scale (MAS; Taylor, 1953), and Taylor's MAS consists of selected items from the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1942) (for a review of the history of the measurement of manifest anxiety see Reynolds & Richmond, 1985). The RCMAS served as

a model for the development of items for the AMAS-E as well as for the AMAS-A and the Adult Manifest Anxiety Scale-College Version (AMAS-C; Reynolds, Richmond, & Lowe, 2003b). (The AMAS-A and AMAS-C are measures of chronic, manifest anxiety and were designed specifically to assess the level and nature of anxiety in the young and middle-age adult, and college student populations, respectively). The original draft of the RCMAS consisted of more than 100 items and an age-appropriate, parallel, contemporary item was written for each of these 100 plus items for the AMAS-E, AMAS-A, and AMAS-C, separately. Additional items were also written to reflect worries and concerns of older adults, young and middle-aged adults, and college students on their respective forms based on the literature. Thus, common and uncommon manifestations of anxiety are found on the original drafts and scaled versions of these four measures: the AMAS-E, AMAS-A, AMAS-C, and RCMAS. The original draft of the AMAS-E consisted of 118 items (Reynolds et al., 2003d).

In the development of new measures, the relations between test score performance and different demographic variables such as age, gender, and education must be investigated. These relations must be examined with extant measures as well. Examination of these relations is imperative on new and existing measures as findings on these measures such as measures of anxiety may not generalize across tests or nominal groupings (Reynolds, 1997). Knowledge about these relations (e.g., the relation between test scores on an anxiety measure and age, gender, or education) increases the probability of accurate test score interpretation and clinical diagnosis (Lowe & Reynolds, 1999; Reynolds, 1997).

One demographic variable that may or may not be associated with test score performance on measures of anxiety among older adults is age. According to Jorm (2000), there is little consensus in the literature about age differences in anxiety. Different researchers have suggested or different studies have shown different trends across age groups. Cattell (1965) hypothesized that anxiety shows a curvilinear relationship with age. Lowe (2001) came to a similar conclusion in a study investigating common manifestations of anxiety across the lifespan. Lowe's sample consisted of 7,224 non-referred individuals, 3,802 females and 3,422 males, ranging in age from 6 to 100 years with less than one to more than 16 years of education. Lowe found a curvilinear relationship between anxiety and age, with children and adolescents, college students, and older adults scoring significantly higher than young and middle-aged adults on a common set of anxiety items found across the lifespan. In contrast, some researchers (e.g., Henderson, Jorm, Korten, Jacomb, Christensen, & Rodgers, 1998; Knight, Waal, & Spears, 1983; Nakazato & Shimonaka, 1989) have reported an inverse relationship between anxiety symptoms and age. Knight et al. (1983) assessed 1,025-2,120 New Zealanders, ages 16 to 89 years, on the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970). Knight and colleagues found an inverse relationship between anxiety test score

performance and age among their sample of New Zealanders. According to the authors, this finding highlights the importance of using appropriate norms when assessing individuals' affective states. Other researchers such as Himmelfarb and Murrell (1984) have reported complex relationships between anxiety and age. Himmelfarb and Murrell assessed 2,051 non-referred adults, ages 55 and older on the STAI, and found that trait anxiety scores peaked in the 75-79 and 85-87 age groups. On the other hand, some researchers (e.g., Fuentes & Cox, 2000; Moerdyk & Spinks, 1979; Vassiliou, Georgas, & Vassiliou, 1967) have reported no relationship between anxiety and age. Moerdyk and Spinks (1979) and Vassiliou et al. (1967) reported no age differences among adults on Taylor's Manifest Anxiety Scale (MAS; Taylor, 1953), whereas Fuentes and Cox (2000) found no age differences among older and younger community-dwelling adults on the Anxiety Sensitivity Index (Reiss & Peterson, 1985) and the STAI. Vassiliou et al.'s (1967) sample consisted of a group of normal adults 18 to over 45 years of age, Moerdyk and Spinks (1979) did not report on the age range of their adult sample, and Fuentes and Cox's (2000) sample consisted of two age groups, a younger age group (ages 25 to 55 years) and an older age group (ages 67 to 94 years). Different studies have used different measures, different age groups, different sampling procedures, and different statistical strategies making comparisons among different studies difficult. At present, it remains unclear as to the association between anxiety and aging among older adults. Whether results similar to Lowe (2001), Knight et al. (1983), Himmelfarb and Murrell (1984), or Fuentes and Cox (2000) would be obtained with a senior sample on a measure of chronic, manifest anxiety designed specifically for older adults is not known at the present time.

Gender is another demographic variable that may be related to test score performance on measures of anxiety among the senior population. Gender differences have been reported with females, regardless of age (i.e., children, adolescents, or adults), scoring relatively higher than males on self-report measures and behavioral rating scales of anxiety symptoms (e.g., Canals, Marti-Henneberg, Fernandez-Ballart, Cliville, & Domenech, 1992; Feingold, 1994; Himmelfarb & Murrell, 1984; Nakazato & Shimonaska, 1989; Reynolds, 1998; Reynolds & Richmond, 1985; Simpson, Parker, & Harrison, 1995). According to Reynolds (1998), gender differences on measures of anxiety appear as early as age six. Possible reasons for the gender differences include: a) females experience more anxiety than males; b) females are more willing to express their feelings of anxiety than males; or c) measures of anxiety tap more feminine rather than more masculine feelings of anxiety (e.g., Mirowsky & Ross, 1995; Reynolds, 1998).

Reynolds (1998) addressed the gender difference issue in a study of 5,258 individuals, 2,709 males and 2,549 females, ranging in age from 5 to 72 years, using four different reliable and valid self-report measures of anxiety: the child and adolescent forms of the Behavior Assessment System for Children-Self-

Report of Personality (BASC-SRP; Reynolds & Kamphaus, 1992b,c), the Checklist of Problems and Resiliency (COPAR; Stanton & Reynolds, 1998), and the RCMAS. Reynolds (1998) created male and female scales for each measure based on the responses of the normative sample to the items found in the original item pool of each measure. Reynolds reasoned if the male and female scales on each measure were similar (i.e., the item overlap between the male and female scales on each measure was 90% or higher), then the scales would be equivalent and thus, the scales would be parallel forms of the common measure. According to Reynolds, these findings along with the gender differences reported on these four different measures, with females scoring higher than males (see Reynolds & Kamphaus, 1992a; Reynolds, 1998; Reynolds & Richmond, 1985), would suggest that females really do display more anxiety. Reynolds' study yielded these results and interpretation. These findings indicate that a relationship does exist between gender and anxiety that generalizes across measures and across age, at least up to 72 years of age.

Fuentes and Cox (2000) examined gender differences in a sample of 132 community-dwelling older adults, 39 females and 45 males, and younger adults, 26 females and 22 males. The sample of older adults ranged in age from 67 to 94 years, whereas the sample of younger adults ranged in age from 25 to 55 years. Fuentes and Cox found that among the older sample women scored higher than men on the ASI and the Trait scale of the STAI.

Reynolds et al. (2003d) examined gender differences in the standardization sample of the AMAS-E. The sample consisted of 636 older adults, 439 females and 197 males, ages 56 to 103 years. Reynolds and colleagues found significant gender differences, with females scoring significantly higher than males on all four anxiety scales of the AMAS-E. These findings along with the results from Fuentes and Cox (2000) and Reynolds' (1998) studies suggest that gender differences do exist in the senior population and across the lifespan on measures of anxiety. However, it is not known at the present time whether gender interacts with other demographic variables such as age and/or education on a measure of chronic, manifest anxiety designed specifically for older adults.

A third variable that may or may not be associated with test score performance on measures of anxiety among older adults is education. Kubzansky, Berkman, Glass, and Seeman (1998) assessed a socioeconomically heterogeneous community sample of 1,192 high functioning older adults on the Anxiety scale of the Hopkins Symptom Checklist (HSCL; Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974). The older adults ranged in age from 70 to 79 years and had an 8th grade education or less to a college degree or more. Kubzansky and colleagues found no relation between anxiety and educational attainment among these seniors. The authors concluded that educational attainment may not confer any advantage in certain affective domains in older adults. Likewise, Wetherell and Arean (1997) found no educational differences in a sample of 197 adults, ages 55 to 92 years, with less than one to more than

17 years of schooling on the Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988). Unlike Kubzansky et al.'s (1998) sample, Wetherell and Arean's (1997) sample consisted of economically disadvantaged older medical outpatients. In contrast, Himmelfarb and Murrell (1984) assessed 2,051 non-referred individuals, ages 55 and older, on the STAI. The sample consisted of 1, 649 individuals who had 12 or less years of schooling and 402 individuals who had completed 13 or more years of education. Himmelfarb and Murrell found that anxiety scores varied inversely with educational attainment. Like Himmelfarb and Murrell, Nakazato and Shimonaka (1989) used the STAI to assess a community sample of 1,234 adults from Japan. The sample consisted of 571 men and 666 women, ages 25 to 92 years, with an average of 12.32 years of education. Nakazato and Shimonaka found that women with fewer years of education had higher STAI scores than women with more years of schooling. Moerdyk and Spinks (1979) and Vassiliou et al. (1967) also reported lower anxiety scores for adults with more years of schooling but on a different measure of anxiety, Taylor's MAS. Vassiliou et al. found significantly lower anxiety scores among a nonclinical college-educated group of adults in comparison to a group of adults who had only completed an elementary school education. The adults in Vassiliou et al.'s sample were 18 to over 45 years of age. Few studies have addressed the relation between education and scores on anxiety measures among older adults and what studies have been conducted have produced equivocal findings. If educational differences do exist, these differences may be associated with financial security and less financial worries among more educated older adults, the development of effective coping strategies among more educated seniors to combat everyday stresses and worries, a social desirability factor in which more educated older adults are more cognizant of the actual content found on measures of anxiety and endorse fewer anxiety symptoms on these measures to create a more positive image, or some other factor. However, at the present time, it is unclear whether an association between education and anxiety test score performance among the older adult population exists and more specifically, whether a relation between education and scores on a measure of anxiety designed specifically for the older adult population exists. Thus, systematic analyses of the relations among education, gender, and age, and anxiety test score performance among older adults are needed.

This paper reports on an investigation of anxiety symptomatology as self-reported among 394 non-referred older adults. The purpose of this study was to explore the relationship of self-reported symptoms of anxiety on the AMAS-E for 60- to 100-year-old adults with age, gender, and education, and to assist in the interpretation of scores in context on such measures. Currently, there is limited information available on the relationship between demographic variables and anxiety test score performance among older adults. In addition, there is limited information available on the relationship between age, gender, and education and AMAS-E test scores in an older adult population.

Method

Subjects

Participants for the present study consisted of 394 adults, 197 females and 197 males. The adults ranged in age from 60 to 100 years with a mean age of 76.61 years (*SD* = 8.99 years). The mean age of the females was 76.61 years (*SD* = 9.01 years) and the mean age of the males was 76.61 years (*SD* = 8.99 years). No gender difference in age was noted for the female and male subsamples, t (392) = .00, $p > .05$. The seniors had completed 7 to 16 years of education, with an average of 13.18 years (*SD* = 2.34 years) of schooling. Females had an average of 13.14 years (*SD* = 2.33 years) of schooling, whereas as males had an average of 13.22 years (*SD* = 2.36 years) of education. No education difference was noted for the female and male subsamples, t (392) = .02, $p > .05$. Ethnic composition of the sample was Caucasian (83.0%), African-American (8.6%), Hispanic (1.0%), and Other (7.4%). There was a small number of minorities in the current sample and thus, an examination of a gender difference across race was not conducted. Some evidence does exist to suggest that there is no difference in the severity of anxiety symptoms among older adults of different racial/ethnic backgrounds (see Wetherell & Arean, 1997). Sample demographics are presented in Table 1.

Table 1

Sample Demographics of the Adult Manifest Anxiety Scale-Elderly Version (AMAS-E)

Variable	n	%
Gender		
Female	197	50.0
Male	197	50.0
Age (years)		
60-74	158	40.1
75-83	153	38.8
84-100	83	21.1
Education (years)		
7-12	210	53.3
13-16	184	46.7
Race/Ethnicity		
African-American	34	8.6
Caucasian	327	83.0
Hispanic	4	1.0
Other	29	7.4

Participants were volunteer adults from independent-living retirement centers, retirement communities, senior citizen centers, and community home owners located in the western, northwestern, and southwestern regions of the United States. Data were collected from rural and urban areas. Data on the socioeconomic status (SES) of the individual adults were unavailable. However, educational level attained is considered to be a suitable substitute for SES in the adult population (e.g., Lowe & Reynolds, 2000).

Instrument

The AMAS-E is a 44-item self-report measure used to assess chronic, manifest anxiety in the older adult population. Each AMAS-E item describes how an individual generally feels, thinks, or acts. An older adult rates each AMAS-E item on a dichotomous scale, using a yes/no format. The more items endorsed by an individual on the measure (i.e., items used to measure anxiety) results in a higher score and a higher score suggests a higher level of anxiety. The AMAS-E can be administered in a group setting or on an individual basis (Reynolds et al., 2003d).

The AMAS-E has adequate psychometric properties. Internal consistency reliability estimates of .71 to .92 for the AMAS-E Total Anxiety scale, three anxiety subscales, and Lie scale scores have been reported (Reynolds et al., 2003d). These internal consistency reliability estimates are in the adequate to excellent range. Temporal stability of the AMAS-E Total Anxiety scale scores and three anxiety subscale scores ranged from .76 to .87 over a 1-week test-retest interval (Reynolds et al., 2003d). These test-retest reliability estimates are in the adequate to good range. Evidence supporting the construct validity of the AMAS-E test scores has been found (see Reynolds et al., 2003d).

Procedure

Volunteer participants completed the AMAS-E in groups and some individually at independent-living retirement centers, retirement communities, senior citizen centers, or their homes. Test administrators gave each participant an AMAS-E and asked the individuals to provide information on their age, gender, educational attainment, and race/ethnicity. Test administrators then requested that each participant read the directions printed at the top of the measure, read each statement on the measure, and mark their responses.

Data Analyses

A Multivariate Analysis of Variance (MANOVA) was conducted using the independent variables of age (60-74, 75-83, and 84-100 years), gender (male, female), and education (7-12, 13-16 years), and Worry/Oversensitivity, Fear of Aging, and Physiological Anxiety subscale raw scores as the dependent variables. The 60-74, 75-83, and 84-100-year age groups represent young, middle-age, and

old adults, respectively within the older adult age group. The General Linear Model (GLM) Multivariate Analysis procedure was used to compute the MANOVA. The GLM model was selected to correct for unequal cell sizes (Norusis, 1994). The MANOVA was followed by ANOVAs using age, gender, or education as the independent variable and Worry/Oversensitivity, Fear of Aging, or Physiological Anxiety subscale raw scores as the dependent variable. Due to multiple significance testing, Bonferroni type I adjustments were made. In addition, two 3 x 2 x 2 (Age x Gender x Education) Analyses of Variance (ANOVAs) were conducted with the Total Anxiety scale raw scores and the Lie scale raw scores serving as dependent variables in separate analyses. The Lie scale raw scores were not analyzed with the three anxiety subscale raw scores because the Lie scale items are factorially separate from the three anxiety subscales and the Lie scale items are not correlated with the first principal factor (i.e., the general anxiety factor or Total Anxiety factor) (see Lowe & Reynolds, 2000). The Total Anxiety scale raw scores were analyzed separately as well to avoid redundancy in the MANOVA. The General Linear Model (GLM) Factorial Analysis of Variance procedure was used in computing the ANOVAs to correct for unequal cell sizes (Norusis, 1994). Planned comparisons followed for the age variable using the Tukey HSD test. Effect sizes were also computed using Cohen's *d* statistic. All analyses were performed using SPSS 10.1, with the exception of Bartlett's homogeneity of variance test and Cohen's *d*, which were computed by hand.

Results

Prior to computing the 3 x 2 x 2 ANOVA with the Total Anxiety scale scores as the dependent variable, Bartlett's homogeneity of variance test was performed. Bartlett's test was selected because of unequal *n*'s and the number of groups. No violation of homogeneity of variance was found, χ (11) = 18.59, $p > .05$. Therefore, a 3 x 2 x 2 ANOVA was calculated. Means and standard deviations on the Total Anxiety scale by gender, education, and age are presented in Table 2.

The three-way ANOVA produced significant main effects for education and gender but not for age. Females scored significantly higher than males on the Total Anxiety scale, $F(1, 382) = 12.64$, $p < .01$, but with a small effect size ($d = .44$). Also, the 7-12 education group scored significantly higher on the Total Anxiety scale than the 13-16 education group, $F(1, 382) = 19.55$, $p < .01$, but again with a small effect size ($d = .41$). In contrast, no significant age effect was noted, $F(2, 382) = .977$, $p > .05$. No or small effect sizes were found for all possible age group comparisons; the effect sizes ranged from .02 to .14. No significant two- or three-way interactions were found.

The 3 x 2 x 2 MANOVA was then calculated. Prior to computing the MANOVA, Box's M test of equality of covariance matrices, Bartlett's test of sphericity, and tests of multicollinearity and singularity were performed. Box's M test was not significant, F (66, 87581) = 75.32, $p > .05$, confirming

homogeneity of variance-covariance matrices. In contrast, Bartlett's test of sphericity was significant, $\chi(5) = 813.15$, $p = .001$, and lead to the rejection of the hypothesis that the correlation matrix is an identity matrix. Furthermore, no evidence of multicollinearity and singularity (i.e., redundancy in the dependent variables) was present as regressions were performed with each dependent variable in turn serving as the dependent variable with all other dependent variables serving as the independent variables in these analyses. Based on these analyses, R^2, the squared multiple correlation, for the dependent variables ranged from .33-.47 and tolerance statistics for the dependent variables ranged from .66 to .84. Table 3 presents the mean Worry/Oversensitivity, Fear of Aging, and Physiological Anxiety subscale scores and standard deviations for males and females separately with 7-12 and 13-16 years of education at ages 60-74, 75-83, and 84-100.

Table 2

Means and Standard Deviations of Total Anxiety Scale Scores by Gender, Education, and Age

		Gender			
		Male		Female	
Age / Statistic	Education (years)	7-12	13-16	7-12	13-16
60-74					
N		39	40	41	38
M		12.03	7.78	16.71	13.61
SD		9.78	6.44	9.26	9.99
75-83					
N		44	34	44	31
M		11.70	12.38	17.18	13.94
SD		7.54	7.25	7.62	9.14
84-100					
N		20	20	22	21
M		15.85	8.70	16.36	9.71
SD		8.69	8.43	10.40	6.21

Table 3
Means and Standard Deviations of Worry/Oversensitivity, Fear of Aging, and Physiological Anxiety Scale Scores by Gender, Education, and Age

			Gender			
			Male		Female	
Scale	Age / Statistic	Education (years)	7-12	13-16	7-12	13-16
Worry/ Oversensitivity	60-74					
	N		39	40	41	38
	M		7.15	4.85	9.37	7.87
	SD		6.40	4.56	5.91	6.15
	75-83					
	N		44	34	44	31
	M		6.20	6.15	9.45	7.23
	SD		5.00	4.71	5.63	6.17
	84-100					
	N		20	20	22	21
	M		8.85	4.25	9.41	4.76
	SD		6.34	5.16	7.78	4.65
Fear of Aging	60-74					
	N		39	40	41	38
	M		2.56	1.45	3.73	2.95
	SD		2.40	1.91	2.42	2.68
	75-83					
	N		44	34	44	31
	M		2.39	2.97	3.57	3.16
	SD		2.20	2.32	2.06	2.13
	84-100					
	N		20	20	22	21
	M		2.65	1.45	3.58	2.78
	SD		2.28	2.28	2.26	2.38
Physiological Anxiety	60-74					
	N		39	40	41	38
	M		2.31	1.48	3.61	2.79
	SD		2.09	1.63	2.26	2.36
	75-83					
	N		44	34	44	31
	M		3.11	3.26	4.16	3.55
	SD		2.03	1.85	1.75	2.22
	84-100					
	N		20	20	22	21
	M		4.35	3.00	3.64	3.05
	SD		1.87	1.81	1.76	1.77

The 3 x 2 x 2 MANOVA results are reported in terms of Wilks' Lambda. The MANOVA produced significant main effects for age, Wilks' $\lambda = .90$, $F(6, 760) = 6.90$, $p < .01$, gender, Wilks' $\lambda = .96$, $F(3, 380) = 5.05$, $p < .01$, and education, Wilks' $\lambda = .95$, $F(3, 380) = 6.50$, $p < .01$. No significant two- or three-way interactions were noted.

Bonferroni type adjustments were made prior to computing the follow-up univariate *F*-tests. Bonferroni type adjustments were made due to multiple significance testing. Multiple significance testing increases the probability of an inflated Type I error rate. For these tests, the alpha level was set at .016. Pearson product moment correlation coefficients between the dependent variables are shown in Table 4. In addition, Bartlett's homogeneity of variance test was calculated for each dependent variable (i.e., Worry/Oversensitivity, Fear of Aging, and Physiological Anxiety). No violations of homogeneity of variance were found for the Worry/Oversensitivity, Fear of Aging, and Physiological Anxiety variables, $\chi(11) = 16.26$, $p > .05$, $\chi(11) = 6.70$, $p > .05$, $\chi(11) = 6.61$, $p > .05$, respectively.

Table 4

Correlations between the Dependent Variables (Worry/Oversensitivity, Fear of Aging, and Physiological Anxiety Scores

	Worry/Oversensitivity	Fear of Aging
Fear of Aging	.57	
Physiological	.58	.40

In Table 5, the means and standard deviations for each of the three age groups on the three dependent variables are presented. The Physiological Anxiety subscale scores reached statistical significance for the main effect of age in the ANOVA, $F(2, 382) = 11.25$, $p < .01$. Planned comparisons revealed that individuals in the 75-83 and 84-100 age groups scored significantly higher on the Physiological Anxiety subscale than adults in the 60-74 age group. Small effect sizes of .47 were noted for these age group comparisons. In contrast, an effect size of .02 was found when comparing the 75-83 and 84-100 age group means. The Worry/Oversensitivity and Fear of Aging subscale scores did not reach statistical significance for the main effect of age in the ANOVAs, $F(2, 382) = .221$, $p > .05$ and $F(2, 382) = 2.57$, $p > .05$. No or small effect sizes resulted from all possible age group comparisons, ranging from .001 to .08 and .14 to .29 for the Worry/Oversensitivity and Fear of Aging subscales, respectively.

Table 5
Means and Standard Deviations of Worry/Oversensitivity, Fear of Aging, and Physiological Anxiety Scale Scores by Age

Scale	Age 60-74 (n = 158)	75-83 (n = 153)	84-100 (n = 83)
Worry/Oversensitivity			
M	7.32	7.33	6.86
SD	5.97	5.51	6.46
Fear of Aging			
M	2.68	3.01	2.35
SD	2.49	2.20	2.32
Physiological Anxiety			
M	2.55*	3.64*	3.54*
SD	2.22	1.95	1.98

* $p < .01$

Means and standard deviations for males and females on the three anxiety subscales are shown in Table 6. ANOVAs revealed that females scored significantly higher than males on the Worry/Oversensitivity subscale, $F(1, 382) = 8.64$, $p < .01$, but with a small effect size ($d = .36$), the Fear of Aging subscale, $F(1, 382) = 12.89$, $p < .01$, but again with a small effect size ($d = .41$), and the Physiological Anxiety subscale, $F(1, 382) = 6.80$, $p < .01$, but also with a small effect size ($d = .36$).

Table 6
Means and Standard Deviations of Worry/Oversensitivity, Fear of Aging, and Physiological Anxiety Scale Scores by Gender

Scale	Gender Male (n = 197)	Female (n = 197)
Worry/Oversensitivity		
M	6.18*	8.27*
SD	5.43	6.16
Fear of Aging		
M	2.26*	3.21*
SD	2.27	2.34
Physiological Anxiety		
M	2.76*	3.51*
SD	2.06	2.10

* $p < .01$

Table 7
Means and Standard Deviations of Worry/Oversensitivity, Fear of Aging, and Physiological Anxiety Scale Scores by Education

Scale	Education 7-12 (n = 210)	13-16 (n = 184)
Worry/Oversensitivity		
M	8.27*	6.04*
SD	6.11	5.41
Fear of Aging		
M	3.05*	2.38*
SD	2.32	2.34
Physiological Anxiety		
M	3.45*	2.77*
SD	2.08	2.08

* $p < .01$

Table 8
Means and Standard Deviations of Lie Scale Score by Gender, Education, and Age

		Gender			
		Male		Female	
Age / Statistic	Education (years)	7-12	13-16	7-12	13-16
60-74					
N		39	40	41	38
M		2.03	2.17	2.73	2.37
SD		1.91	2.10	1.96	1.85
75-83					
N		44	34	44	31
M		3.02	2.24	3.30	2.45
SD		2.22	2.36	2.22	2.20
84-100					
N		20	20	22	21
M		2.75	2.25	3.68	2.90
SD		1.83	1.86	2.23	2.36

In Table 7, the means and standard deviations for the 7-12 and 13-16 education groups on the Worry/Oversensitivity, Fear of Aging, and Physiological Anxiety subscales are shown. ANOVAs revealed that the 7-12 education group scored significantly higher than the 13-16 education group on the Worry/Oversensitivity subscale, $F(1, 382) = 17.97, p < .01$, but with a small effect size ($d = .39$), Fear of Aging subscale, $F(1, 382) = 9.09, p < .01$, but again with a small effect size ($d = .29$), and Physiological Anxiety subscale, $F(1, 382) = 10.37, p < .01$, but also with a small effect size ($d = .32$).

To examine the association between the demographic variables and the Lie scale, a 3 x 2 x 2 ANOVA was calculated. Before computing the factorial

ANOVA, Bartlett's test was performed. No violation of homogeneity of variance was found $\chi(11) = 6.12, p > .05$. Means and standard deviations on the Lie scale by gender, age, and education are shown in Table 8.

The factorial ANOVA produced significant main effects for gender and education. Females scored significantly higher than males on the Lie scale, $F(1, 382) = 4.98, p < .05$, but with a small effect size ($d = .22$). Moreover, individuals with 7-12 years of education scored significantly higher on the Lie scale than adults with 13-16 years of schooling, $F(1, 382) = 5.49, p < .05$, but again with a small effect size ($d = .25$). In contrast, a nonsignificant effect was found for age on the Lie scale, $F(1, 382) = 2.55, p > .05$. No or small effect sizes ranging from .05 to .29 were found for all possible age group comparisons. No significant two- or three-way interaction effects were found on the Lie scale variable.

Discussion

The results from the present study suggest that demographic variables are related to self-report of anxiety among non-referred older adults. Significant gender and education differences on the three anxiety dimensions were reported. In addition, age differences in the characteristic presentation along one of the three dimensions of anxiety were found. Females consistently scored relatively higher than males on all three anxiety dimensions in addition to the Total Anxiety scale. These findings are in agreement with previous studies on gender differences in affect (e.g., Feingold, 1994). Regardless of age, females have reported higher levels of anxiety in comparison to males on self-report measures of anxiety and behavioral rating scales (e.g., Barrio, Moreno-Rosset, Lopez-Martinez, & Olmedo, 1997; Canals, Marti-Henneberg, Fernandez-Ballart, Cliville, & Domenech, 1992; Feingold, 1994; Himmelfarb & Murrell, 1984; Nakazato & Shimonaska, 1989; Reynolds, 1998; Simpson, Parker, & Harrison, 1995). Feingold (1994) conducted four meta-analyses to examine gender differences in anxiety. Females scored nearly one third of a standard deviation above males on measures of trait anxiety, and this magnitude of gender differences did not vary significantly with age. It is interesting to note that instruments created uniquely for specific populations (i.e., children, adolescents, adults, or older adults) and purported to measure manifest anxiety have produced results indicating that a gender difference exists (e.g., Moerdyk & Spinks, 1979; Reynolds, 1998; Reynolds & Richmond, 1978, 1985; Vassiliou, Georgas, & Vassiliou, 1967) in reported anxiety levels across the entire life span.

With regard to the interpretation of test scores on an anxiety scale, it is important to know whether females are more anxious than males or are more willing to admit to the presence of common symptoms of anxiety. This has clear implications for the diagnosis of anxiety as a disorder and for the assessment of its relative importance as a symptom in other disorders. Reynolds (1998) explored this issue in detail among individuals age 5 to72 years and concluded that females do display more anxiety than males and that a common set of self-report items is

appropriate for both genders. Whether this finding will hold with the older adult population is not known as the present time, but until it is shown otherwise, the weight of evidence at other ages argues for a common interpretation of the anxiety test scores of senior men and women.

Educational differences were also reported in the current study. Individuals with 12 or less years of schooling reported higher levels of anxiety than those individuals who had completed 13-16 years of education on the Total Anxiety scale and the three anxiety subscales. These findings are consistent with previous research with non-referred adults on measures of chronic, manifest or trait anxiety (e.g., Moerdyk & Spinks, 1979; Vassiliou et al., 1967). Moerdyk and Spinks (1979) and Vassiliou and colleagues (1967) found that chronic, manifest or trait anxiety varied inversely with educational attainment in their samples of adults. Possible reasons for these findings include: a) individuals with more education are more aware of the actual content of the measure and endorse fewer symptoms of anxiety on the instrument in an attempt to create a more positive image (Vassiliou et al., 1967), b) individuals with more education are more secure financially, have fewer financial worries, and thus experience fewer anxiety symptoms, or c) individuals with more education develop more effective coping strategies (e.g., problem-focused coping strategies instead of emotion-focused coping strategies) and use these effective coping strategies to resolve problems, and thus reduce anxious feelings.

No age differences were noted on the Total Anxiety scale. This finding is somewhat surprising due to the widespread attention given to and subsequent affect of "alleged" stressors reported to be associated with aging or the aging process, including retirement, limited financial resources, relocation (see Carstensen, 1988), health impairment (e.g., Carstensen, 1988; Powers, Wisocki, & Whitbourne, 1992; Stanley & Beck, 2000), and reduction in social activities (e.g., Stanley & Beck, 2000). Instead, the finding of no age differences on the Total Anxiety scale is in agreement with previous research with young and middle-aged adults (Moerdyk & Spinks, 1979; Vassiliou et al., 1967), and children and adolescents (Reynolds & Richmond, 1985) in which no relation between age and chronic, manifest anxiety has been reported. However, age differences did emerge on the Physiological Anxiety subscale. This finding suggests that anxiety may be enhanced somewhat along this dimension with advancing age. In other words, physical concerns may become more prevalent with an increase in age among non-referred older adults. In the current study, the Physiological subscale scores increased significantly with age, peaking in the 75-83 age group, and then declining slightly in the 84-100 age group. Research on the relationship between age and anxiety among seniors is relatively small (e.g., Carstensen, 1988; Hersen & Van Hasselt, 1992; Hersen, Van Hasselt, Goreczny, 1993) in comparison to other age groups. Additional studies are needed to explore this relationship in greater detail among older adults.

In contrast, no significant age differences were found on the Lie scale; however, significant education and gender differences were noted. The Lie scale on the AMAS-E is designed to assess social desirability or faking good. Individuals with 12 or less years of schooling obtained significantly higher Lie scale scores on the AMAS-E in comparison to individuals with 13-16 years of education. As mentioned previously, one plausible explanation for this finding is that individuals with more schooling are more aware of the content of the scale and respond in a manner to create a more positive image (Vassiliou et al., 1967). Females also scored significantly higher than males on the AMAS-E Lie scale. A plausible explanation for this relation is that females may be more attuned to socially desirable behaviors (e.g., interpersonal communication, relationships with others, and so on; Gilligan & Attanucci, 1988) and may therefore respond in a more socially desirable manner. Further examination of these findings seems warranted.

On a final note, there are several limitations with regard to the present study. First, the sample used in the current study was not a random sample or a random, stratified sample. When samples are not random or stratified, a source of bias may be introduced. However, the current sample is relatively large and provides an excellent opportunity to examine variations in demographic variables (i.e., age, gender, and education) within the older adult population. Another limitation in the present study is the sample was predominately White. Although Reynolds and Richmond (1985) found no significant difference by race on the RCMAS Total Anxiety scale, at the present time, it is not known if this finding would be found among the senior population as well or if any of the three anxiety dimensions' scores would differ by race among older adults. As a result, studies addressing race/ethnic differences in addition to other demographic variables such as SES in the senior population on the AMAS-E are needed. A third limitation in the present study is the use of a cross-sectional design. Cross-sectional designs provide information on individuals of different ages at a single point in time (e.g., Cole & Cole, 1993; Santrock, 1998). Therefore, extrapolation and guesswork are needed to examine the developmental course of a behavior, in this case, the different manifestations of anxiety. Also, cohort effects may have been present. Thus, longitudinal studies to explore the course and prevalence of anxiety in later life would not only be interesting but would add invaluable information to our limited knowledge base on anxiety in the senior population. Given the limited information and research on anxiety among older adults (e.g., Hersen & Van Hasselt, 1992; Hersen et al., 1993), the AMAS-E appears worthy of future investigations.

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