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## CORRELATES OF ANXIETY AT THREE STAGES OF THE FOREIGN LANGUAGE LEARNING PROCESS

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*Foreign language anxiety is a complex phenomenon that occurs at each stage of the language learning process (i.e., input, processing, and output). This study of 205 university students attempted to identify a combination of variables that might be correlated with these three types of anxiety. Canonical correlation analyses revealed that students with the highest levels of anxiety at the input, processing, and output stages tend to be older; have lower expectations of their achievement in foreign language courses, low perceived global self-worth, low perceived scholastic competence, low perceived intellectual ability, and low perceived job competence; and have taken few or no high school foreign language courses. Academic achievement acted as a suppressor in the model by increasing the predictive power of the independent variables. The educational implications of these findings for understanding foreign language anxiety and for increasing foreign language learning are discussed, as are suggestions for future research.*

Although foreign language anxiety has been the subject of research for many years (for extensive reviews, see MacIntyre, 1999; MacIntyre & Gardner, 1991; Scovel, 1978, 1991; Young, 1994), only in the past two decades has it been conceptualized as a multidimensional construct. Specifically, foreign language anxiety has been theorized as occurring at each of the following three stages: input, processing, and output (MacIntyre & Gardner, 1994b). Anxiety at the input stage (i.e., *input anxiety*) refers to the apprehension that students experience when

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AUTHORS' NOTE: *The authors would like to clarify from the outset that the present analysis extends previous work (i.e., Onwuegbuzie, Bailey, & Daley, 1999a, 1999b, 2000) undertaken by the authors using the same database.*

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they are presented with a new word or phrase in the target language. The level of input anxiety depends on the student's ability to attend to, concentrate on, and encode external stimuli (MacIntyre & Gardner, 1994b). Anxiety experienced at this stage may reduce the effectiveness of input by limiting the anxious student's ability to attend to material presented by the instructor and reducing the student's ability to represent input internally (Tobias, 1977). According to MacIntyre and Gardner (1994b), students with high levels of input anxiety may ask their foreign language instructors to repeat sentences more often than do their low-anxious counterparts, or they may have to reread material in the target language several times to compensate for missing or inadequate input.

Anxiety at the processing stage (i.e., *processing anxiety*) refers to the apprehension students experience when performing cognitive operations on new information. The amount of processing anxiety encountered appears to depend on the complexity of the information, the extent on which memory is relied, and the level of organization of the presented material (Tobias, 1986). According to Tobias (1977), anxiety at this stage can impede learning by reducing the efficiency with which memory processes are used to solve problems. Moreover, high levels of processing anxiety may reduce a student's ability to understand messages or to learn new vocabulary items in the target language (MacIntyre & Gardner, 1994b).

Finally, anxiety at the output stage (i.e., *output anxiety*), involves the apprehension students experience when required to demonstrate their ability to use previously learned material. In particular, anxiety at this stage involves interference that appears after processing has been completed, but before it has been reproduced effectively as output (Tobias, 1977). According to MacIntyre and Gardner (1994b), high levels of anxiety at this stage might hinder students' ability to speak or to write in the target language.

MacIntyre and Gardner (1994b) note that the three stages of anxiety are somewhat interdependent. That is, each stage depends on the successful completion of the previous one. Indeed, not only are high-anxious students likely to be more prone to interference at all three stages, but such interference is most probably cumulative (Tobias, 1977, 1986). In other words, anxiety that reduces or restricts the proportion of effective input may place a greater burden on processing to compensate for the proportion of input that previously was not successfully registered. The anxiety that also may ensue at this processing stage may be exacerbated by the reduced efficiency of the ongoing processing, which, in turn, may heighten anxiety levels at the output stage, culminating in further deficits (Tobias, 1977, 1986).

Since the development by MacIntyre and Gardner (1994b) of scales to measure anxiety at the input, processing, and output stages, two studies (MacIntyre & Gardner, 1994b; Onwuegbuzie, Bailey, & Daley,

1999b) have reported significant relationships between foreign language achievement and anxiety at each of these stages. Moreover, using an experimental design, MacIntyre and Gardner (1994a) found that anxiety aroused by a video camera impaired students' performance, particularly at the processing and output stages, suggesting not only that anxiety is a cause of underachievement in foreign language classes but also that separating foreign language anxiety into these three stages aids our understanding of the anxiety-achievement relationship.

According to Aida (1994), research on foreign language anxiety still is underdeveloped and "studies examining the relationship between anxiety and learner characteristics will help us increase our understanding of language learning from the learner's perspective and provide a wider range of insights" (p. 165). Some characteristics of anxious students in foreign language classes have been determined. For example, Onwuegbuzie, Bailey, and Daley (1999a) found that students with the highest levels of global foreign language anxiety—as measured by the Foreign Language Classroom Anxiety Scale (FLCAS) (Horwitz, Horwitz, & Cope, 1986)—tended to have at least one of these characteristics: older, high academic achievers, had never visited a foreign country, had not taken any high school foreign language courses, had low expectations of their overall average for their current language course, had a negative perception of their scholastic competence, and had a negative perception of their self-worth. In another study investigating the relationship between learning styles and foreign language anxiety, Bailey, Daley, and Onwuegbuzie (1999) reported that students who are not responsible in attempting assignments and who preferred not to learn in cooperative groups tended to have higher levels of anxiety.

The fact that all three studies that simultaneously have used measures of input anxiety, processing anxiety, and output anxiety (MacIntyre & Gardner, 1994a, 1994b; Onwuegbuzie et al., 1999b) reported a consistent negative relationship between these scales and foreign language achievement justifies formal examinations of the antecedents of these dimensions of anxiety. Yet, to date, no study has investigated the characteristics of students who are prone to anxiety at each of the three stages of the foreign language process. Indeed, as noted by MacIntyre and Gardner (1994b), previous studies have used scales of language anxiety that are primarily focused on output and thus have not pursued the question of whether MacIntyre and Gardner's conceptualization of the three stages of language anxiety yields important differences in results from more global measures of foreign language anxiety such as the FLCAS.

Thus, the purpose of the present study was to replicate the work of Onwuegbuzie et al. (1999a), which examined a combination of variables in relation to scores on the FLCAS. A logical analysis of the FLCAS revealed that of the 33 items, 16 appear to be related to the

output stage, 10 to global attitudes toward foreign language study, 4 items appear to measure input anxiety, and only 3 items measure processing anxiety. Thus, we hypothesized that MacIntyre and Gardner's (1994b) three scales might not only serve to replicate the findings of Onwuegbuzie et al. (1999a) but, by differentiating between the three stages, provide further insight into the development of foreign language anxiety in the classroom. We thus sought to identify via canonical correlation analyses which, if any, of the factors in Onwuegbuzie et al. (1999a) would correlate with anxiety at the three stages of the language learning process.

Canonical correlation is a statistical technique that breaks down the association between two sets of variables and is appropriate for describing the number and nature of mutually independent relationships between the sets (Stevens, 1986). This multivariate technique was used under the assumption that anxiety levels at the three stages are interdependent (MacIntyre & Gardner, 1994b) and cumulative (Tobias, 1977, 1986). We theorized that this application of canonical analysis would identify specific learner characteristics that might better explain the nature of foreign language anxiety, by determining whether MacIntyre and Gardner's (1994b) scales isolated significant factors related to the three stages. The same variables as in Onwuegbuzie et al. (1999a) were used as predictors in the present study: gender, age, academic achievement (as measured by grade point average), number of foreign countries visited, expectation of foreign language achievement, perceived self-worth, perceived intellectual ability, perceived scholastic competence, number of high school foreign language courses taken, perceived job competence, perceived creativity, cooperativeness, competitiveness, and individualism. These variables comprised seven measures of self-perception, three measures of social interdependence, and four demographic characteristics.

Participants were 205 college students (67.3% female) who were enrolled in Spanish ( $n = 125$ ), French ( $n = 61$ ), and German ( $n = 19$ ) introductory, intermediate, and advanced courses at a large university in the midsouthern United States. Students participated voluntarily and were required to sign an informed consent document. Mean age for the sample was 22.7 ( $SD = 6.6$ ). Overall, the proportion of students who reported studying the foreign language as a requirement was 61.8%. Also, 94.9% reported that English was their native language. Mean grade point average was 3.07 ( $SD = 0.58$ ).

An ANOVA revealed no differences between students enrolled in the introductory, intermediate, and advanced courses with respect to input anxiety ( $F = 0.41, p > .05$ ), processing anxiety ( $F = 0.49, p > .05$ ), or output anxiety ( $F = 1.69, p > .05$ ). In addition, no differences were found between the three language groups with respect to input ( $F = 0.11, p > .05$ ), processing ( $F = 0.13, p > .05$ ), or output anxiety ( $F = 0.29, p > .05$ ). Indeed, previous research (Bailey, Onwuegbuzie, & Daley, 1998) has

demonstrated that these three language groups experience similar levels of anxiety. Therefore, the responses of all participants were combined.

Participants were administered the Input Anxiety Scale, the Processing Anxiety Scale, the Output Anxiety Scale, the Self-Perception Profile for College Students, the Social Interdependence Scale, and the Background Demographic Form. The three anxiety scales were developed by MacIntyre and Gardner (1994b). Each scale contains six 5-point Likert-format items (i.e., 1 = *strongly agree*, 2 = *agree*, 3 = *neutral*, 4 = *disagree*, 5 = *strongly disagree*) that assess how anxious students feel at the input, processing, and output stages. For each scale, three items are positively worded and three items are negatively worded. All negative items were key-reversed before scoring, such that high scores on any of these scales represent high levels of anxiety at the corresponding stage. Sample items for the Input Anxiety Scale include the following: "I get flustered unless French/German/Spanish is spoken very slowly and deliberately" and "I get upset when I read in French/German/Spanish because I must read things again and again." Sample items for the Processing Anxiety Scale include the following: "I am anxious with French/German/Spanish because, no matter how hard I try, I have trouble understanding it" and "I feel anxious if French/German/Spanish class seems disorganized." Finally, sample items for the Output Anxiety Scale include the following: "I may know the proper French/German/Spanish expression, but when I am nervous, it just won't come out" and "When I become anxious during a French/German/Spanish test, I cannot remember anything I studied."

MacIntyre and Gardner (1994b) reported coefficient alpha reliabilities of .78, .72, .78, for the Input Scale, the Processing Scale, and the Output Scale, respectively. Concurrent validity of the scales was demonstrated (MacIntyre & Gardner, 1994b) via

1. significant correlations ( $p < .001$ ,  $n = 97$ ) between scores on the Foreign Language Classroom Anxiety Scale (Horwitz et al., 1986) and scores on the Input Anxiety Scale ( $r = .62$ ), the Processing Anxiety Scale ( $r = .69$ ), and the Output Anxiety Scale ( $r = .81$ );
2. significant correlations ( $p < .001$ ,  $n = 97$ ) between scores on the French Class Anxiety Scale (Gardner, 1985) and scores on the Input Anxiety Scale ( $r = .67$ ), the Processing Anxiety Scale ( $r = .70$ ), and the Output Anxiety Scale ( $r = .82$ ); and
3. significant correlations ( $p < .001$ ,  $n = 97$ ) between scores on the French Use Scale (MacIntyre & Gardner, 1988) and scores on the Input Anxiety Scale ( $r = .64$ ), the Processing Anxiety Scale ( $r = .64$ ), and the Output Anxiety Scale ( $r = .72$ ).

In addition, Onwuegbuzie, Bailey, and Daley (2000) reported evidence of construct validity for the Input Anxiety Scale, the Processing Anxiety Scale, and the Output Anxiety Scale, based on a common factor analysis using 258 participants, in which (a) one specific factor was

identified for the Input Anxiety Scale, which explained 43.3% of the total variance; (b) one specific factor was identified for the Processing Anxiety Scale, which explained 44.0% of the total variance; and (c) one specific factor was identified for the Output Anxiety Scale, which explained 44.7% of the total variance. Loadings ranged from .30 to .78 for the Input Anxiety Scale, from .32 to .72 for the Processing Anxiety Scale, and from .47 to .69 for the Output Anxiety Scale. Also, these authors reported significant correlations ( $p < .001$ ,  $n = 258$ ) between scores on the Foreign Language Classroom Anxiety Scale (Horwitz et al., 1986) and scores on the Input Anxiety Scale ( $r = .64$ ), the Processing Anxiety Scale ( $r = .77$ ), and the Output Anxiety Scale ( $r = .73$ ). For the present study, the scores pertaining to the Input Anxiety Scale, the Processing Anxiety Scale, and the Output Anxiety Scale had classical theory alpha reliability coefficients of .74, .74, and .76, respectively.

The Self-Perception Profile for College Students (SPPCS) is a 54-item scale (Neemann & Harter, 1986). For each item, students are asked first to indicate which of the two types of students they are most like (e.g., "Some students do very well at their studies" vs. "Other students don't do very well at their studies"). The student then decides whether the chosen description is "sort of true" or "really true" for him or her. According to the authors,

The effectiveness of this question format lies in the implication that half of the students in the world (or in one's reference group) view themselves in one way, whereas the other half view themselves in the opposite manner; either choice is legitimized. (Neemann & Harter, 1986, p. 4)

The SPPCS comprises 13 subscales. For every subscale, half of the items are worded with negative statements. Each item is scored from 1 to 4, such that a 1 indicates *low self-perception* and a score of 4 reflects *high self-perception*.

Only the following five subscales were used: (a) perceived self-worth, (b) perceived intellectual ability, (c) perceived scholastic competence, (d) perceived job competence, and (e) perceived creativity. According to its authors, the reliabilities of these subscales, as assessed by coefficient alpha, range from .76 to .89 (Neemann & Harter, 1986). For the current study, the scores pertaining to each of the self-perception measures had classical theory alpha reliability coefficients as follows: perceived self-worth, .89; perceived intellectual ability, .82; perceived scholastic competence, .72; perceived job competence, .74; and perceived creativity, .88.

The Social Interdependence Scale, developed by Johnson and Norem-Hebeisen (1979), is a 22-item, 5-point Likert-type questionnaire measuring individuals' cooperative, competitive, and individualistic perceptions. Scores on the cooperative (7 items) and individualistic (7 items) scales range from 7 to 35, whereas scores on the competitive scale (8 items) range from 7 to 40. The higher the score on each scale,

the more cooperative, the more competitive, or the more individualistic the respondents consider themselves to be. Scores on these scales are relatively independent so that a student conceivably could receive a high score on all three scales. Reliability, as measured by coefficient alpha, has been found by its authors to be .94 for the cooperative scale, .85 for the competitive scale, and .73 for the individualistic scale (Jones, Slate, & Marini, 1995). For the present study, the scores pertaining to each of the social-interdependence measures had classical theory alpha reliability coefficients of .88 for the cooperative scale, .88 for the competitive scale, and .91 for the individualistic scale.

Finally, the Background Demographic Form, developed specifically for this study, extracted relevant information such as age, gender, native language, countries visited, and expectation of achievement in the current foreign language course.

The multivariate analysis most appropriate for the present study is canonical correlation. A canonical correlation analysis was conducted to identify a combination of self-perception, social interdependence, and demographic variables that might be correlated with a combination of foreign language anxiety dimensions. Canonical correlation analysis is recommended to examine the relationship between two sets of variables, when each set contains more than one variable (Darlington, Weinberg, & Walberg, 1973; Thompson, 1980, 1984). Indeed, as noted by Knapp (1978), "virtually all of the commonly encountered tests of significance can be treated as special cases of canonical correlation analysis" (p. 410). That is, canonical correlation analysis can be used to undertake all the parametric tests that canonical correlation methods subsume as special cases, including multiple regression, ANOVA, ANCOVA, and *t* tests (Thompson, 1988).

In the present study, the three stages of foreign language anxiety were treated as the dependent multivariate profile, whereas the 14 self-perception, social interdependence, and demographic variables were treated as the independent multivariate profile. The number of canonical roots that can be generated for a given data set is equal to the number of variables in the smaller of the two variable sets. Thus, three canonical roots were generated.

In addition, two types of canonical coefficients were computed: standardized canonical function coefficients and structure coefficients (see Reynolds, Stanton, McLean, & Kaufman, 1989). Standardized canonical function coefficients are derived weights applied to each of the variables in a given set to obtain the composite variate used in the canonical correlation analysis. As such, standardized canonical function coefficients are analogous to factor pattern coefficients in factor analysis or to beta coefficients in a regression analysis (Arnold, 1996). Structure coefficients are the correlations between a given variable (dimension) and the scores on the canonical composite (i.e., latent variable) in the set to which the variable (dimension) belongs (Thompson, 1980).

Thus, structure coefficients indicate the degree of relationship of a given variable in the set with the canonical composite for the variable set. The square of the structure coefficient is the proportion of variance that the original variable shares linearly with the canonical variate.

Table 1 presents the correlation matrix from which the canonical correlation analysis was undertaken. Because the purpose of this study was to investigate multivariate relationships assumed to underlie these correlations, the correlation matrix was not interpreted.

The strength of the relationship between the two sets of variables was assessed by examining the magnitude of the canonical correlation coefficients, which indicate the degree of relationship between the weighted independent variables and the weighted anxiety variables. The significance of the canonical roots was tested via the  $F$  statistic based on Rao's (1952) approximation.

The canonical analysis revealed that all three canonical correlations combined were statistically significant ( $p < .0001$ ). However, when the first canonical root was excluded, the remaining two canonical roots combined were not statistically significant. Similarly, with the removal of the first and second canonical roots, the remaining canonical roots combined were not statistically significant. Together, these results suggest that the first canonical function was statistically significant, but all subsequent canonical roots were not statistically significant. However, because the calculated probabilities are sensitive to sample size, particular attention should be paid to the educational (practical) significance of the obtained results (Thompson, 1980). The educational significance of canonical correlations typically is assessed by examining their size (Thompson, 1980, 1984, 1988, 1990a, 1990b). The canonical correlation indicates how much variance the sets of weighted original variables share with each other (Thompson, 1988). In the present study, the first canonical correlation ( $R_{c1} = 61.4\%$ ) is educationally significant, contributing 37.7% (i.e.,  $R_{c1}^2$ ) of the shared variance. The remaining two canonical correlations explained 10% or less of the variance. Consequently, only the first canonical correlation was interpreted.

Data pertaining to the first canonical root are presented in Table 2. The redundancy estimates provide further insight into the relationship between the two sets of variables. The redundancy estimate is equal to the average of the squared multiple correlation of each of the variables in one set with all the variables in the other set (Pedhazur, 1982). The redundancy estimates (Table 2) indicate that on average, 28% of the total variance in the set of foreign language anxiety components was accounted for by the linear combination of independent variables, whereas 5% of the independent variable set variance was accounted for by a linear combination of the anxiety set. The adequacy estimates (Table 2), which measure the degree to which each set's variance is represented in the canonical solution, indicate that 74% of the

Table 1  
*Correlation Matrix (decimals omitted)*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Input anxiety																	
2. Processing anxiety	63																
3. Output anxiety	57	69															
4. Gender	07	10	06														
5. Age	10	30	23	-09													
6. Academic achievement	05	14	05	02	17												
7. Number of countries visited	-22	-09	-12	-20	14	09											
8. Expectation	-26	-35	-31	-02	-10	17	-06										
9. Perceived self-worth	-14	-18	-23	-08	01	-05	09	01									
10. Perceived intellectual ability	-18	-25	-21	-11	-04	04	04	14	63								
11. Perceived school competence	-32	-30	-34	-08	05	30	09	21	54	61							
12. Number of high school language courses	-13	-27	-18	25	-45	03	-10	14	-13	-09	-02						
13. Perceived job competence	-21	-23	-22	-13	-01	-11	08	07	66	58	46	-10					
14. Perceived creativity	-09	-08	-08	-18	08	-03	01	-09	51	51	41	-21	49				
15. Cooperativeness	-20	-14	-12	-06	12	-07	-01	08	18	08	07	-11	25	15			
16. Competitiveness	-14	-10	-19	-11	-04	10	02	18	-06	07	21	-01	07	02	13		
17. Individualism	10	11	07	10	-02	12	-01	-09	-05	07	09	07	-11	-04	-65	-10	

total anxiety set variance was represented in that set's canonical composite and that 12% of the independent variable set variance was represented in its composite. However, because redundancy coefficients are not truly multivariate, caution should be exercised in interpreting the redundancy coefficients (Thompson, 1988, 1991). In fact, many researchers recommend against interpreting redundancy coefficients (Humphries-Wadsworth, 1997; Thompson, 1988, 1991).

An examination of the structure coefficients (Table 2) revealed that, using a cutoff correlation of .3 recommended by Lambert and Durand (1975) as an acceptable minimum loading value, foreign language anxiety at all three stages made very large contributions to the first canonical variate. The square of the structure coefficients (Table 2) indicated that 61% of the variance in input anxiety, 90% of the variance in processing anxiety, and 71% of the variance in output anxiety were accounted for by the anxiety cluster. Thus, processing anxiety made the largest contribution to the anxiety set of input, processing, and output. With regard to the independent variable cluster, the following variables made an important contribution: age, expectation of foreign language achievement, perceived self-worth, perceived intellectual ability, perceived scholastic competence, number of high school foreign language courses taken, and perceived job competence. The square of the structure coefficients (Table 2) indicated that 20% of the variance in age, 36% of the variance in expectation of foreign language achievement, 12% of the variance in perceived self-worth, 16% of the variance in perceived intellectual ability, 31% of the variance in perceived scholastic competence, 14% of the variance in number of high school foreign language courses taken, and 16% of the variance in perceived job competence were accounted for by the independent variable cluster. Thus, expectation of foreign language achievement made the largest contribution to the first canonical variate. Perceived scholastic competence also made a modest contribution, with the remaining variables making a small to moderate contribution.

The standardized canonical function coefficients (Table 2) revealed that two of the three foreign language anxiety dimensions (i.e., processing anxiety and output anxiety) made an important contribution to the anxiety composite—with processing anxiety being the major contributor. Input anxiety did not appear to make an important contribution to this composite.

With respect to the independent variable set, age, academic achievement, expectation of foreign language achievement, and perceived scholastic competence appeared to be the only major contributors. However, because standardized function coefficients typically are highly affected by the collinearity (i.e., large intercorrelations) of the variables in a given set (Thompson, 1990b), standardized canonical function coefficients should be interpreted with caution. For example, in Table 2, perceived intellectual ability does not have a significant

Table 2  
*Canonical Solution for First Function*

Variable	Standardized Coefficient	Structure Coefficient	Squared Structure Coefficient
Anxiety dimension			
Input anxiety	.23	.78*	.61
Processing anxiety	.60*	.95*	.90
Output anxiety	.30*	.84*	.71
Adequacy (mean of structure <sup>2</sup> )			.74
Redundancy (Adequacy $\times R_{el}^2$ )			.28
Independent variables			
Gender	.11	.13	.02
Age	.30*	.45*	.20
Academic achievement	.38*	.17	.03
Number of countries visited	-.20	-.20	.04
Expectation	-.44*	-.60*	.36
Perceived self-worth	-.01	-.34*	.12
Perceived intellectual ability	.02	-.40*	.16
Perceived school competence	-.55*	-.56*	.31
Number of high school language courses	-.28	-.38*	.14
Perceived job competence	-.03	-.40*	.16
Perceived creativity	-.04	-.14	.02
Cooperativeness	-.20	-.27	.08
Competitiveness	-.06	-.24	.06
Individualism	-.01	.18	.03
Adequacy (mean of structure <sup>2</sup> )			.12
Redundancy (Adequacy $\times R_{el}^2$ )			.05

\* Loadings with effect sizes larger than .3 (Lambert & Durand, 1975).

standardized coefficient (.02), but its structure coefficient (-.40) is significant. This suggests that perceived intellectual ability is significantly related to the canonical composite (which comprises the independent variables). However, perceived intellectual ability does not predict the three stages of foreign language anxiety because the presence of some of the independent variables, most probably perceived school competence and expectation, reduces its predictive ability. Accordingly, structure coefficients typically are deemed to be more interpretable than are standardized coefficients.

Overall, the structure coefficients pertaining to the first canonical root suggest that students with the highest level of anxiety at the input, processing, and output stages tend to be older; to have lower expectations of their achievement in foreign language courses; to have low perceived global self-worth; to have low perceived scholastic competence; to have low perceived intellectual ability; to have low perceived job competence; and to have taken few, if any, high school foreign language courses. The standardized canonical function coefficients indicate that academic achievement may have acted as a suppressor in

the model by increasing the predictive power of the independent variables, because this variable had a moderate standardized coefficient but a small structure coefficient (Thompson, in press).

A major finding of this study was that five of the seven variables identified as significant predictors of the three anxiety scales were the same as in Onwuegbuzie et al. (1999a), which used the FLCAS (Horwitz et al., 1986). That is, age, prior high school experience with foreign languages, expected overall course average, perceived scholastic competence, and perceived self-worth were significant predictors in both studies, whereas perceived intellectual ability and perceived job competence in the present study replaced academic achievement and prior history of visiting foreign countries in the earlier study. The strong degree of overlap in these findings suggest that, on one hand, at least insofar as this particular set of factors is concerned, use of MacIntyre and Gardner's (1994b) scales may not lead to significant increases in predictive power. On the other hand, these findings suggest that MacIntyre and Gardner's scales can be used as an alternative to Horwitz et al.'s (1986) FLCAS.

However, caution should be exercised in comparing the findings of the present study with Onwuegbuzie et al.'s (1999a) results because they involved the same database (in which some of the research participants were common to both studies). In fact, it is possible that the somewhat dependent nature of these two sets of findings may have inflated the Type I error rate for the present analysis—although it should be noted that the present results were not only based on statistical significance tests but also on measures of practical significance (i.e., effect sizes). In any case, given the paucity of studies using the input, processing, and output anxiety scales, more research is clearly needed to ascertain the utility of MacIntyre and Gardner's (1994b) conceptualization.

The finding that processing anxiety made the largest contribution to the anxiety set is particularly important because previous measures of foreign language anxiety have tended to neglect anxiety at this stage. Indeed, Horwitz et al.'s (1986) FLCAS appears to contain only three items measuring anxiety at the processing stage. Although it is possible that MacIntyre and Gardner's (1994b) six-item Processing Anxiety Scale does not completely measure the anxiety experienced at this stage, it seems likely that the incremental validity of the FLCAS may increase with the addition of more items relating to processing anxiety. Items worded to elicit responses from learners concerning their frustration and anxiety as they study, learn, and revise for exams might very well tap important aspects of processing anxiety that are perhaps underreported in the current form of the FLCAS.

The fact that six of the seven aspects of self-perception were found to be predictors of the three stages of foreign language anxiety is in itself an important confirmation of the relationship between anxiety and

self-perception. This finding is consistent with Onwuegbuzie et al. (1999a), who found that three components of self-perception (i.e., perceived scholastic competence, perceived self-worth, and expectation of foreign language achievement) were related to a global measure of foreign language anxiety (FLCAS). The fact that expectation of foreign language achievement had the largest loading with respect to the structure correlation function also parallels Onwuegbuzie et al.'s finding that this variable was the biggest predictor of global foreign language anxiety.

As noted by Onwuegbuzie et al. (1999a), the observed relationship between expectation of foreign language achievement and anxiety at the three stages of learning also supports (a) the findings of Gynan (1989) and Horwitz (1984, 1988) that students' beliefs about second language acquisition can be a source of anxiety; (b) MacIntyre and Gardner's (1991) assertion that foreign language anxiety stems from "negative expectations that lead to worry and emotionality" (p. 110); and (c) Krashen's (1980) affective filter theory, in which low expectations of students in foreign language classes render them unreceptive to language input, which, in turn, decreases performance. Nevertheless, despite the consistency of these findings and assertions, the exact causal nature of the self-perception/anxiety relationship still needs to be determined.

The fact that older students had higher levels of input anxiety, processing anxiety, and output anxiety than did younger students is consistent with the work of Onwuegbuzie et al. (1999a) and might reflect the often replicated finding of age-related declines in performance (Salthouse, 1985, 1989, 1991, 1992). Moreover, as conceptualized by Onwuegbuzie et al., the age-anxiety relationship finding may have stemmed from (a) age-related declines in the ability to acquire mastery of the fine points of language, such as phonology and morphology, as well as the capacity to speak a second language without an accent (Lieberman, 1984; Newport, 1986); (b) older adults' tendency to be reluctant to pronounce, translate, or write words in the target language about which they are uncertain (Onwuegbuzie et al., 1999a); and (c) older adults' tendency to make more errors of omission than commission (Okun, 1976; Okun, Siegler, & George, 1978) and to place greater emphasis on accuracy than do young adults (Salthouse & Somberg, 1982).

The finding that students who had not taken any high school foreign language classes had higher levels of input, processing, and output anxiety than did their more language-experienced counterparts suggests the importance of encouraging students to study a foreign language at the secondary school level (Onwuegbuzie et al., 1999a), because such experience likely leads to greater competence and thus lower anxiety at the college level. Although it is possible that some factor not included in the present study accounts for lower reported

anxiety levels among students with prior high school language experience, it seems likely that many college students with little or no early language training feel they are at a learning disadvantage when they compare themselves to classmates in college who have studied a foreign language in high school. Interestingly, Onwuegbuzie et al. (1999a) found that prior high school experience with foreign languages was statistically significantly related to level of anxiety; however, prior college-level experience with foreign languages was not associated with anxiety. These two findings suggest that having prior training in foreign languages may not be as important in determining levels of anxiety as how early that experience takes place. Indeed, this conclusion supports researchers (e.g., Scovel, 1969; Seliger, 1978; Seliger, Krashen, & Ladefoged, 1975) who contend that puberty is a critical period for foreign language learning ability. Moreover, Lenneberg (1967) asserted that after puberty, "foreign languages have to be taught and learned through a conscious and labored effort" (p. 176).

Because the university in the present study does not distinguish "true beginners" from students with prior high school experience in its 1st-year classes, it is not surprising that inexperienced students would report more anxiety in classes where they feel they are competing with more competent peers. This finding also implies that the greater competence of more experienced students results in their lower reported anxiety. However, it cannot be assumed that all student anxiety is directly attributable to differences in competence, because it has been shown that with actual language proficiency controlled, anxious students tend to underestimate their competence relative to less anxious students (MacIntyre, Noels, and Clément, 1997). To help those students who may be subject to such misperceptions, it may be necessary, where possible, to offer true-beginner classes to make less experienced students feel more at ease. At the very least, teachers in 1st-year classes where students have varying experience levels could state openly that they are aware of these differences and discuss them with the students.

Finally, overall academic achievement acted as a suppressor variable in the canonical correlation model. Suppressor variables are variables that assist in the prediction of dependent variables due to their correlation with other independent variables (Tabachnick & Fidell, 1996). Indeed, in the present study, grade point average was related to expectation of foreign language achievement ( $r = .17, p < .05$ ) and perceived scholastic competence ( $r = .30, p < .0001$ ). Thus, academic achievement improved the prediction of anxiety at the three stages of foreign language learning by suppressing variance that is irrelevant to this prediction, as a result of its relationship with expectation of foreign language achievement and perceived scholastic competence. However, from Table 1 it can be seen that although academic achievement was not related to input anxiety ( $r = .05, p > .05$ ) or output anxiety

( $r = .05, p > .05$ ), a small but statistically significant correlation was observed between academic achievement and processing anxiety ( $r = .14, p < .05$ ). Thus, it could be argued that rather than acting as a suppressor variable, academic achievement is a correlate of anxiety at the three stages of the language learning process. In any case, future research should investigate the interactions between perceptions of achievement; actual academic achievement; and the three stages of input anxiety, processing anxiety, and output anxiety.

In conclusion, although the first canonical correlation contributed 37.7% (a large effect size using Cohen's [1988] criteria) of the shared variance between the independent variables and anxiety at the three foreign language learning stages, more than 62% of the shared variance remains unexplained. Thus, future research should investigate the contributions made by other variables to the prediction of anxiety at the three stages of the foreign language learning process.

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