British Journal of Educational Psychology (2007), 77, 579–593
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www.bpsjournals.co.uk

Test anxiety in UK schoolchildren: Prevalence and demographic patterns

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Background. Despite a large body of international literature concerning the antecedents, correlates of and treatments for test anxiety, there has been little research until recently using samples of students drawn from the UK. There is a need to establish some basic normative data for test anxiety scores in this population of students, in order to establish whether international research findings may generalize to UK schoolchildren.

Aim. To collect some exploratory data regarding test anxiety scores in a sample of UK schoolchildren, along with socio-demographic variables identified in the existing literature as theoretically significant sources of individual and group differences in test anxiety scores.

Sample. Key Stage 4 students (1348): 690 students in the Year 10 cohort and 658 students in the Year 11 cohort, drawn from seven secondary schools in the North of the UK.

Method. Data on test anxiety were collected using a self-report questionnaire, the *Test Anxiety Inventory* (Spielberger, 1980) and additional demographic variables through the *Student Profile Questionnaire*. The factor structure of the Test Anxiety Inventory was explored using principal components analysis and multiple regression analysis used to predict variance in self-reported test anxiety scores from individual and group variables.

Results. The principal components analysis extracted two factors, worry and emotionality, in line with theoretical predictions. Gender, ethnic and socio-economic background were identified as significant predictors of variance in test anxiety scores in this dataset. Whether English was an additional, or native, language of students did not predict variance in test anxiety scores and year group was identified as a predictor of emotionality scores only.

Conclusion. Variance in the test anxiety scores of Key Stage 4 students can be predicted from a number of socio-demographic variables. Further research is now required to assess the implications for assessment performance, examination arrangements and appropriateness of using a North American measure of test anxiety in a UK context.

Since the early 1950s, a large body of literature has established the antecedents, correlates of and treatments for 'test anxiety', a form of social-evaluation anxiety

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DOI:10.1348/000709906X161704

experienced in an assessment context. Measurement tools have been developed, individual and group norms established and a number of theories proposed to account for the detrimental effect of test anxiety on assessment performance. As Stöber and Pekrun (2004) have noted, the number of such publications since 1952 is over 1000. Initially, the majority of research was drawn from North America, but from the 1970s onwards, the popularity of the test anxiety construct has spread throughout Western Europe and into the Middle and Far East.

It is therefore surprising to find that until relatively recently, test anxiety has been largely neglected by researchers in the UK. For instance, O'Neil and Fukumura (1992) present cross-cultural differences in test anxiety data drawn from 14 different counties including North America, the Netherlands, Japan, India and Egypt, but with no representative sample from the UK. A single study comparing English and North American primary schoolchildren (Sarnoff, Lighthall, Waite, Davidson, & Sarason, 1958) stands out as the only major contribution to the test anxiety literature using data drawn from a UK sample of students for over 40 years.

Only recently, has this trend been reversed by Ed Keogh and his colleagues using undergraduate samples to test predictions made by the processing efficiency theory (Keogh & French, 2001; Keogh, Bond, French, Richards, & Davies, 2004; Richards, French, Keogh, & Carter, 2000) and a cognitive behavioural intervention in a sample of Year 11 school students (Flaxman, Bond, & Keogh, 2002). Despite the assertion by Seipp and Schwarzer (1996) that test anxiety only shows a small degree of cross-national differentiation, Zeidner (1990) argues that, due to variations in cultural and socialization practices, schooling, societal expectations and so forth, the results of previous work should not be uncritically generalized to other national populations. It should therefore be properly questioned whether the findings from research conducted largely outside of the UK will generalize to students in the UK educational system in the absence of knowledge about test anxiety in this population of students.

The test anxiety construct is widely accepted to be multidimensional, consisting of the 'worry' and 'emotionality' components (Liebert & Morris, 1967). Worry refers to the cognitive component of test anxiety, such as negative and derogatory self-statements related to failure. Emotionality refers to affective physiological component of test anxiety, the person's perception of autonomic arousal and tension. Worry and emotionality scores correlate to a high degree (Ware, Galassi, & Dew, 1990); however, they are elicited and maintained by different conditions. Worry is triggered by internal and external cues that focus on evaluative situations as threatening to one's esteem, whereas emotionality is triggered by the immediate external cues of the assessment situation itself (Eysenck, 1992). Individuals high in test anxiety have more structured and pervasive 'worry clusters' in long-term memory, which include thoughts and images based on prior experiences of evaluative situations involving failure. These clusters predispose test anxious individuals to perceive assessment situations as more threatening and worry cognitions are more easily triggered.

In the transactional model of test anxiety proposed by Spielberger and Vagg (1995), features of the assessment context (e.g. importance of the assessment, test taking skills, etc.) interact with individual differences in trait test anxiety to determine the extent to which that assessment is appraised as threatening. This initial appraisal is followed by a continuing interpretive reappraisal of threat throughout the period of that particular assessment. If a student is able to respond to assessment demands, an assessment may be reappraised as less threatening followed by a decrease in state anxiety and worry cognitions. Difficulties in any of the processing stages required in order to respond to an

assessment demand (e.g. question interpretation, retrieval of information from memory and formulating a response) can result in a reappraisal of an assessment as more threatening, followed by an increase in state anxiety and worry cognitions associated with a debilitating effect on assessment performance.

Early 'cognitive interference' models (e.g. Sarason, 1984; Wine, 1971) suggest that worry cognitions occupy limited processing resources, directing attention away from assessment demands. Later models such as the 'processing efficiency' theory (Eysenck & Calvo, 1992) suggest that the additional demands on working memory resources made by task-irrelevant worry cognitions may reduce processing efficiency, but not necessarily the effectiveness. A highly test anxious student could maintain effectiveness on tasks requiring low working memory demands with extra effort to compensate for lowered efficiency. A decline in processing effectiveness would only be predicted on assessment demands making heavy demands on working memory resources (e.g. difficult questions, high memory load, tasks involving coordinative complexity, etc.). Only under these conditions, would a decline in task performance manifest.

The primary aim of the study reported here is to begin to address the paucity of knowledge about test anxiety in UK by collecting some exploratory data about the basic features of test anxiety in the sample students in their final 2 years of compulsory schooling (Years 10 and 11). The completion of compulsory schooling and the GCSE examinations constitute what Denscombe (2000) refers to as a 'crucial moment' in the lives of young people in determining their subsequent life trajectory. This stage of schooling would therefore seem an appropriate place to begin the collection of exploratory data regarding test anxiety in the UK educational system.

Measurements of trait test anxiety will be taken to establish norms using an established measurement tool and the extent to which variance in reported trait test anxiety can be accounted for by a number of theoretically significant socio-demographic individual and group variables will be established. Highlighting sources of variance in trait test anxiety would be an important step in identifying students at risk from debilitating educational consequences and may also begin to highlight factors, which might be important antecedents of test anxiety for students in UK schools. From the existing international literature, the following individual and group variables have been identified as likely possibilities to account for variance in test anxiety scores for students aged 14–16 years: gender, ethnic background, socio-economic background, age and whether English is an additional language.

Gender differences in test anxiety have been reported as a robust finding with female students reporting a higher level of test anxiety than male students (Hembree, 1988; Zeidner, 1998). Several studies have noted that gender differences in test anxiety are larger for the emotionality component of test anxiety (e.g. Zeidner, 1990; Zeidner & Schleyer, 1999). However, in a sample of college entrance examinees, Zeidner and Nevo (1992) reported that gender differences in test anxiety were solely attributable to the emotionality component. No gender differences were noted in the worry component. On the basis of this literature, it is predicted that female students in the UK will report higher test anxiety scores than male students and that difference will be larger for the emotionality component of test anxiety.

Differences in ethnic background have been reported between black-American and white-American students and between students from Hispanic origin and white-American students (Hembree, 1988). In both cases, the non-white-American students reported higher levels of test anxiety; however, differences between black-American and white-American students reduced with age and were negligible by grades 9–12.

In contrast, an Israeli study reported non-significant differences in the ethnic background of students (Israeli, Sephardic or European) on test anxiety (Zeidner & Safir, 1989). From the existing literature, it is not possible to make a clear prediction about ethnic differences in the reported test anxiety of UK students. In the absence of existing data, it may be useful to establish whether ethnicity is a source of variance in test anxiety for students in the UK, in order that risk groups can be identified.

Some research has reported a small, but significant, negative relationship between socio-economic background (SEB) and test anxiety (Hembree, 1988; Zeidner & Safir, 1989), but this relationship has not been replicated in all cases (Zeidner & Schleyer, 1999). Using a general measure of distress, the General Health Questionnaire (GHQ), in the context of an Australian school-leaving qualification (the New South Wales Higher School Certificate) rather than a specific measure of test anxiety, Hodge, McCormick, and Elliot (1997) found that a higher degree of distress was reported by students from lower socio-economic status families. The weight of evidence indicates that a higher degree of test anxiety/examination-related distress is reported by students from lower socio-economic backgrounds. On the basis of this evidence, it is predicted that, for SEB, students in the UK from lower socio-economic backgrounds will also report higher test anxiety scores.

Hembree (1988) reported that in North American schoolchildren, test anxiety scores plateau around grades 8–9 and show a gradual decline in grades 9–12. However, using the GHQ, Hodge *et al.* (1997) reported that examination-related distress increased in the final year of compulsory education leading to the school-leaving qualification. It may be possible to account for the difference between these findings through the role of 'high stakes' testing in the final year of compulsory schooling. Only recently, has 'high stakes' testing been introduced to the latter stages of compulsory schooling in the USA with the advent of the 'No Child Left Behind' legislation (Hursh, 2005). Thus, the findings reported by Hembree reflect a period in which high-stakes testing was not a commonplace practice. In contrast, the findings reported by Hodge *et al.* reflect an educational practice more similar to that found in the UK, where compulsory schooling is completed with high-stakes statutory examinations (cf. Denscombe, 2000). On the basis of this evidence, it is predicted that students in the UK will report higher test anxiety in the final year of compulsory education (Year 11). The Hodge *et al.* study also reported higher examination-related distress in Australian students whose native language was not English. From this evidence, it is predicted that students in the UK for whom English is an additional language will report higher test anxiety scores.

In summary, the principal aim of the present study is to explore test anxiety in a sample of KS4 students (Years 10 and 11) from the UK and whether variance in test anxiety scores can be predicted from the following individual and group factors: gender, ethnic background, socio-economic background (SEB), year group and whether English is an additional language. As this study will make use of an existing measure of trait test anxiety, which has yet to be used in the context of the UK educational system, an additional aim of this study is to examine the factor structure of this measure.

Method

Participants and institutions

The sample consisted of $N = 1{,}348$ Key Stage 4 students drawn from seven schools across the north of the UK. Schools were not randomly selected, but chosen to reflect the diverse ability, ethnic and sociocultural background of students living in this area.

All were non-denominational comprehensive schools, six of which had specialist status. On the basis of the most recent Ofsted reports, none of the schools were classed as 'failing', however, two were judged to be 'improving' schools. According to 'Autumn Package'[1] data, the selected schools reflected a wide range of ability. When judged on the basis of the number of students gaining A*–C grades at GCSE (or equivalent) from the period of 2002–2005, four schools would be judged as below average for English schools and one as above average (DfES, 2005).

At the time of data collection, 690 students were in the Year 10 cohort, aged 14–15 years (the penultimate year of compulsory education) and 658 were in the Year 11 cohort, aged 15–16 years (the final year of compulsory education). At the end of Key Stage 4 (Years 10 and 11), students complete statutory assessments leading to school-leaving qualifications in academic subjects or in combination with vocational qualifications. As noted earlier, these qualifications can be considered as 'high stakes' forms of assessment, as the results can and will influence access to employment and further educational opportunities (Denscombe, 2000).

Instrumentation and data collection

Participants completed the Test Anxiety Inventory (TAI) in form groups as part of an ongoing project into evaluative stress and anxiety in Key Stage 4 school students. The TAI is a situation-specific trait measure of the anxiety experienced during assessment contexts appropriate for use with high school students, college students and undergraduates (Spielberger, 1980). This inventory comprises 20 items requiring a Likert-format response from four ordered categories. On the original questionnaire, 16 items correspond to worry and emotionality components and separate scores can be provided for these subscales (eight items correspond to each subscale).

Although a number of other inventories have been developed since the TAI, two reasons determined the choice of this particular inventory. First, the TAI represents the most established measure of test anxiety in the literature; it has been translated into many languages for use in other cultures and numerous studies have validated the two-factor structure (Benson, Moulin-Julian, Schwarzer, Siepp, & El-Zahhar, 1992). Many of the other inventories developed for research purposes lack validity and display gender, demographic and cultural biases (Anderson & Sauser, 1995). Second, it is one of the few instruments specifically designed for, and validated on, high school students. These arguments suggest that the most appropriate instrument for use in an exploratory study of test anxiety in the UK is the TAI.

Additional variables were measured using a purpose-designed questionnaire, the *Student Profile Questionnaire* (SPQ) available on request from the author. The year group of the students (Year 10 or 11), gender and whether English was an additional language (EAL) were measured using dichotomous categories. Ethnic background was measured in four categories: Black, Asian, White and Other, developed from a standardized university equal opportunities monitoring form. Socio-economic background (SEB) was measured using the Office of National Statistics (2002) four-point categorical system of Routine/manual, Intermediate and Managerial/professional. The final category, Not classified, represents a heterogeneous category, including

[1] *The 'Autumn Package' refers to the analysis of national test and assessment results at ages 7, 11 and 14 and public examination results ages 16 by governmental agencies and departments. These are published in the autumn on the DfES website (http://www.dfes.gov.uk/performancetables/).*

persons not working because of retirement, ill health, unemployment and full-time study. The SPQ required students to provide the employment details of the head of household and responses were coded by the researcher according to the Office of National Statistics protocol.

Results

Principal components analysis of the TAI

In order to establish the reliability of the TAI with a UK sample, the factor structure was examined using principal component analysis (KMO = .97). A promax rotation was used as previous findings have indicated an oblique factorial relationship between measures of worry and emotionality (Ware *et al.*, 1990). The principal components analysis extracted two factors with eigenvalues >1.00, accounting for 49.87% of variance in items' scores. Factor loadings are presented in Table 1. Items with a factor loading of >0.4 have been included for the interpretation of a factor and items cross-loading on both factors excluded. Inter-factor correlation was high ($r = .71$) and both factors show a high degree of internal consistency (factor 1 $\alpha = .88$ and factor 2 $\alpha = .87$). Examination of the item content is broadly consistent with the theoretical expectations based on original TAI. This two-factor solution loads nine items on a physiological affective dimension of anxiety and ten items on a cognitive appraisal dimension. Item 18 did not load $>.40$ on either factor. Due to the degree of similarity

Table 1. Principal components analysis of the TAI

		Factor loadings	
	Item Name	1	2
9.	Even when I'm well prepared for a test, I feel very nervous about it	.85	
12.	I wish examinations did not bother me so much	.78	
16.	I worry a great deal before taking an important examination	.77	
15.	I feel very panicky when I take an important test	.73	
1.	I feel confident and relaxed while taking tests	.72	
11.	During tests, I feel very tense	.68	
8.	I feel very jittery when taking an important test	.65	
10.	I start feeling very uneasy just before getting a test paper back	.63	
2.	While taking examinations, I have an uneasy, upset feeling	.51	
5.	During exams, I find myself thinking about whether I'll ever get through school		.85
6.	The harder I work at a test, the more confused I get		.85
3.	Thinking about my grade in a course interferes with my work on tests		.75
4.	I freeze upon important exams		.64
7.	Thoughts of doing poorly interfere with my concentration on tests		.57
17.	During tests, I find myself thinking about the consequences of failing		.54
13.	During tests, I am so tensed that my stomach gets upset		.51
14.	I seem to defeat myself while working on important tests		.50
20.	During examinations, I get so nervous that I forget facts I really know		.44
19.	After an exam is over, I try to stop worrying about it but I can't		.44
18.	I feel my heart beating very fast during important tests		
	Percentage of variance	43.76	6.12
	Cronbach's α	.88	.87

Note. Items with loadings lower than 0.4 have been omitted for clarity.

between the original factor structure of TAI and the factor solution presented in this analysis, the terms 'worry' and 'emotionality' have been retained.

Descriptive data

Descriptive data for TAI total and component scores along with individual and group differences are shown in Table 2. (Data for the worry and emotionality components are based on the factor solution presented in this study and not for the original components presented in Spielberger (1980). Female students reported higher test anxiety scores than male students. Minor differences were apparent in the TAI data for SEB; students from the two comparison groups, Routine/manual and Not classified, reported lower scores than the two remaining comparison groups, Managerial/professional and Intermediate. Students from Black, Asian and Other ethnic backgrounds reported higher TAI scores than students from White ethnic backgrounds. Students for whom English is an additional language also reported higher TAI scores. This group of students were strongly represented by students from an Asian background (81.5%), suggesting that these two variables may be related. Students in Year 10 reported higher TAI scores than Year 11 students; however, as female students are more strongly represented in this year group (70.5%), these two variables may also be related. Individual and group differences in TAI total scores are replicated in the worry and emotionality components.

Table 2. Individual and group differences in TAI scores

	TAI		Worry		Emotionality	
	M	*SD*	*M*	*SD*	*M*	*SD*
Total	45.25	12.92	20.92	6.67	22.17	6.44
Gender						
Male	41.04	12.38	19.01	6.35	19.93	6.18
Female	47.76	12.61	22.04	6.60	23.50	6.24
Socio-economic background						
Managerial/professional	46.22	13.95	21.62	7.24	22.69	6.77
Intermediate	46.69	12.53	21.48	6.36	23.01	6.39
Routine/manual	45.62	11.95	21.05	6.14	22.59	6.16
Not classified	44.10	12.51	20.70	6.60	21.65	6.29
Ethnic background						
Black	48.81	12.70	23.13	6.79	23.16	6.31
Asian	47.80	11.94	22.15	6.67	22.86	5.78
White	43.97	12.99	20.28	6.53	21.77	6.58
Other	50.42	12.78	23.34	6.94	24.60	6.09
English as an additional language						
English	44.83	13.02	20.67	6.67	22.09	6.53
Other	47.62	11.64	22.36	6.25	22.61	5.62
Year group						
Year 10	46.10	13.05	21.54	6.91	22.25	6.33
Year 11	44.37	12.74	20.28	6.34	22.09	6.56

Regression analyses

Multiple linear regression analyses were conducted to predict TAI total score (Model 1) and the worry and emotionality components (Models 2 and 3, respectively) from the explanatory variables identified as theoretically significant from the existing literature: year group, gender, ethnic background, SEB and EAL. The advantage of this approach is that it is possible to establish the effect of one factor while controlling for the influence of all other variables entered into the model, removing the need for repeated analysis of variance (Connolly, 2006; Hutcheson & Sofroniou, 1999). One of the requirements of ordinary least squares (OLS) regression is that all variables have been measured on a continuous scale. In this study, only the predicted variable, test anxiety, had been measured on a continuous scale. All explanatory variables were measured categorically. Nonetheless, it is still possible to employ OLS regression with categorical explanatory variables using a procedure referred to as dummy coding (Hutcheson & Sofroniou, 1999).

In the method of dummy coding employed in this analysis, indicator coding, data for explanatory variables were transformed into dichotomies and coded as absent (0) or present (1) in that category. For example, the four SEB categories were recoded into four separate dichotomous dummy variables and a single participant coded as absent or present in each category. A student identified as belonging to a Managerial/professional background would be coded as present on that dummy variable and absent on the remaining three. All other categorical explanatory variables were dummy coded using the same number of categories described in *Instrumentation and Data Collection*. All variables were entered in a single step to predict total TAI score (Model 1), worry and emotionality component scores (Models 2 and 3, respectively). All the three models significantly predicted test anxiety (total or component) scores, while accounting for a relatively small proportion of variance (Model 1: $F_{11,1303} = 14.67$, $p < .01$, $R^2 = .09$; Model 2: $F_{11,1303} = 11.94$, $p < .01$, $R^2 = .07$; Model 3: $F_{11,1303} = 14.38$, $p < .01$, $R^2 = .08$).

Partial F and p values for model items are shown in Table 3. Model 1 shows gender, ethnic background and SEB were significant variables for predicting TAI total score, but not EAL or year group. A comparison of Models 2 and 3 suggests that some differences may exist for these factors in the prediction of the separate worry and emotionality components. Although year group was not a significant predictor of TAI total or worry scores, it was a significant predictor of emotionality scores. Gender was a significant predictor of both worry and emotionality scores; however, a comparison of the F values reveals a stronger effect on emotionality scores. Ethnicity and SEB were significant predictors of both worry and emotionality scores. EAL was not a significant predictor of either worry or emotionality scores.

Results of the regression analyses for the dummy coded model items are shown in Table 4. When interpreting the data in this table, it is important to bear in mind that when using indicator coding, one category must serve as a 'reference category' against which regression coefficients for other categories are compared. Hence, if k number of categories for a particular explanatory variable entered into a regression model, $k - 1$ categories will be represented in the analysis, with the remaining (constant) category serving as reference. In this study, the final category of each categorical variable was arbitrarily selected as the reference category. The constant values in Table 4 correspond to the following reference categories: female, Year 11, English first language, white ethnic background and 'managerial/professional' SEB.

Table 3. Partial *F* and *p* values for model items

	Sum Sq.	*df*	*F*	*p*
Model 1: TAI total scores				
Gender	12,988	1	85.61	<.01
Ethnic background	3465	3	7.61	<.01
EAL	1	1	0.01	.95
SEB	1668	3	3.67	.02
Year group	88	1	0.58	.45
Model 2: Worry scores				
Gender	2426	1	59.31	<.01
Ethnic background	623	3	5.08	<.01
EAL	15	1	0.37	.55
SEB	530	3	4.32	.01
Year group	12	1	0.29	.59
Model 3: Emotionality scores				
Gender	3823	1	101.07	<.01
Ethnic background	684	3	6.03	<.01
EAL	15	1	0.41	.52
SEB	353	3	3.11	.03
Year group	188	1	4.96	.03

Table 3 showed that gender was a significant predictor of variance in test anxiety scores and from the dummy coded categorical variables shown in Table 4, it can be seen that female students reported test anxiety scores of 6.6 intervals higher than a male student ($p < .01$). A comparison of the *t* values for gender in Models 2 and 3 supports the interpretation, offered above, that gender differences are larger in the emotionality component. For ethnic background, Table 4 shows that students from Other, Asian and Black backgrounds reported significantly higher test anxiety scores of 5.6, 4.4 and 4.6 intervals, respectively, than students from a White background ($p < .01$, $p < .01$ and $p = .01$, respectively). A comparison of Models 2 and 3 highlights differences that are present in both worry and emotionality components. In summary, higher test anxiety scores were reported by female students and students from Asian, Black and Other ethnic backgrounds reported higher test anxiety scores than students from White backgrounds.

Year group provides an interesting contrast between the descriptive data and the regression parameters. The descriptive data in Table 2 show that Year 10 students reported slightly higher test anxiety scores; however, the regression parameters in Table 4 indicate that differences in TAI scores for year were non-significant; Year 10 students reported slightly lower test anxiety scores of .06 intervals ($p = .45$). One possible interpretation is that the descriptive data were influenced by an overrepresentation of female students in Year 10 who reported higher test anxiety scores. The parameters estimated in the regression model are likely to present a more accurate representation of year group differences by controlling for gender and other individual/group differences. A comparison of Models 2 and 3 supports the interpretation offered above that year group is a significant predictor of variance in emotionality scores; Year 10 students reported significantly higher emotionality scores of 1.0 intervals ($p = .03$).

Table 4. Regression analyses for model items with dummy coded categorical variables

	B	SE	*t*	*p*
Model 1: TAI total scores				
Constant[a]	44.80	0.982	45.63	<.01
Gender				
Male	−6.60	0.714	−9.25	<.01
Ethnic background				
Other	5.66	1.845	3.06	<.01
Asian	4.44	1.153	3.85	<.01
Black	4.57	1.652	2.76	.01
EAL				
Other	−0.08	1.333	−0.06	.95
SEB				
Routine/manual	3.57	1.108	3.22	<.01
Intermediate	1.78	1.001	1.78	.07
Not classified	1.29	1.300	1.03	.30
Year group				
Year 10	−0.58	0.760	−0.76	.45
Model 2: Worry scores				
Constant[a]	20.05	0.510	39.31	<.01
Gender				
Male	−2.86	0.371	−7.70	<.01
Ethnic background				
Other	2.26	0.958	2.35	.02
Asian	1.62	0.599	2.70	.01
Black	2.45	0.858	2.85	.01
EAL				
English	0.42	0.694	0.61	.55
SEB				
Routine/manual	2.06	0.576	3.59	<.01
Intermediate	1.17	0.520	2.24	.02
Not classified	1.35	0.654	2.06	.04
Year group				
Year 10	0.21	0.395	0.54	.59
Model 3: Emotionality scores				
Constant[a]	22.92	0.490	46.73	<.01
Gender				
Male	−3.59	0.357	−10.05	<.01
Ethnic background				
Other	2.89	0.922	3.14	<.01
Asian	1.95	0.576	3.38	<.01
Black	1.62	0.825	1.96	.05
EAL				
English	−0.43	0.667	−0.64	.52
SEB				
Routine/manual	1.42	0.554	2.56	.01
Intermediate	0.27	0.500	0.54	.59
Not classified	0.19	0.629	0.30	.77
Year group				
Year 10	−0.85	0.380	−2.23	.03

[a]In the regression equation, the constant value represents the dummy coded comparison categories for: female, White, English first language, Managerial/professional SEB and Year 11.

For SEB, Table 4 shows that students from Routine/manual SEB reported significantly higher test anxiety scores of 3.6 intervals than students from a Managerial/professional background ($p < .01$). Although students from Intermediate and Not classified backgrounds also reported higher test anxiety scores of 1.8 and 1.3 intervals, respectively, and these differences were not significant ($p = .07$ and $p = .30$, respectively). A comparison of Models 2 and 3 highlights some differences between worry and emotionality scores for SEB. Replicating the effect shown for TAI total scores, students from a Routine/manual background reported significantly higher worry scores of 2.1 intervals and emotionality scores of 1.4 internals ($p < .01$ and $p = .01$, respectively). Students from Intermediate and Not classified backgrounds both reported significantly higher worry scores of 1.2 and 1.4 intervals ($p = .02$ and $p = .04$, respectively), but non-significantly higher emotionality scores of 0.3 and 0.2 intervals ($p = .59$ and $p = .77$, respectively). In summary, students from a Managerial/professional SEB reported lower TAI total and component scores than students from a Routine/manual SEB. Differences between students from Managerial/professional and both Intermediate and Not classified SEBs were present on TAI total and worry scores only.

Discussion

The principal component analysis suggested a two-factor solution to TAI items from a sample of UK students. This analysis offers broad support for the theoretical predictions made from the original TAI; however, some minor differences do require highlighting. Seven of the nine items loading on factor 1 corresponded to the original emotionality subscale of the TAI and the remaining two items (items 1 and 12) were originally left unallocated. On the original scale, these two items showed moderate loadings on both worry and emotionality components; however, it should be noted that loadings were higher for the emotionality component. Eight of the ten items on factor 2 corresponded to the original worry subscale of the TAI and the remaining two items (items 13 and 19) were originally left unallocated. On the original scale, these two items also showed moderate loadings on both worry and emotionality components; item 13 showed a slightly higher loading on worry and item 19 on emotionality. The item which did not load $< .40$ on either factor (item 18) was originally allocated to the emotionality subscale.

Two items present potential anomalies. Item 16 loads strongly on factor 1 (emotionality), while containing item content referring to 'worry'. This item originally loaded on the emotionality scale of the TAI. Item 13 loads moderately on factor 2 (worry), while containing item content referring to the perception of physiological arousal. This item originally showed moderate loadings on both worry and emotionality components, although stronger for worry. One possible interpretation is that despite item 16 referring to 'worry', the defining content of the item may share with other factor 1 items a concern with affect (i.e. the student may 'feel' worried). Although not a cognitive form of interference, item 13 may share in common with other factor 2 items the potential to distract attention away from assessment demands. This interpretation is consistent with conceptualizations of test anxiety that include an emotional aspect which is not made distinct in test anxiety inventories, but reflected in cognitive and emotionality components (e.g. Sarason, 1984).

The regression analysis indicated that variance in TAI scores could be predicted from gender, ethnic background and SEB (in addition, variance in emotionality scores alone could be predicted by year group). However, the relatively small R^2 statistic ($R^2 = .09$) suggested that together these variables account for only a relatively small proportion of

the variance in test anxiety scores. This finding is not entirely surprising given that the previous literature has suggested that the major determinant of test anxiety is likely to be the previous experience of failure in assessment situations (King *et al.*, 1989). Confirming predictions made in the existing literature, gender differences in TAI scores showed that female students reported a higher level of test anxiety than male students. These findings however do not support Zeidner and Nevo (1992) that gender differences are attributable solely to the emotionality component. In this sample, although the magnitude of the effect was greater in the emotionality component, significant gender differences were present in both the worry and emotionality components.

The ethnic background of students was also a source of variance in TAI scores; students from a white ethnic background reported lower test anxiety than students from Asian, Black or Other ethnic backgrounds. Zeidner (1998) is critical of research attaching *post hoc* explanations of cultural differences. However, it is interesting to note that while students from Black and Asian backgrounds reported higher levels of test anxiety, the educational attainment of these groups in the UK is very different. Students from certain British–Asian backgrounds (e.g. British–Chinese and British–Indian) outperform all other ethnic groups in British compulsory education, while students from British–Black backgrounds are identified as an underperforming group (DfEE, 2001). The value placed on educational success by different ethnic groups (cf. Frances & Archer, 2004) may play an important role in determining differential levels of test anxiety.

The differences between the students from a British–White ethnic background and students from the Other ethnic backgrounds replicates the North American findings for younger aged students, but not the findings for similar aged high school students (Hembree, 1988) or the findings from Israeli students (Zeidner & Safir, 1989). However, this result may not be surprising. If, as Aysan, Thompson, and Hamarat (2001) argue, culture is an important variable in determining the expression of test anxiety, the degree of test anxiety shown by a particular ethnic group in a particular host culture is likely to result from the complex interplay of a number of factors specific to that ethnic group and host culture. It may not be unexpected for ethnic differences in test anxiety to emerge in one host culture and not another.

These findings are consistent with research using North American and Israeli samples showing that higher levels of test anxiety are reported by groups from lower socio-economic backgrounds (Hembree, 1988; Zeidner & Safir, 1989). It should be noted, however, that the systems used to categorize SEB might differ from one project to another making direct comparison of findings difficult. For instance, Zeidner and Safir categorize SEB in terms of social class, whereas the classification used in this project (Office of National Statistics, 2002) involves a deliberate move away from conceptions of SEB based on social class to those based on labour relations. It would therefore seem prudent to clarify the relationship reported in this sample; variance in test anxiety scores is predicted by a labour relation-based classification of SEB. It is entirely possible that alternative classifications of SEB in the UK (e.g. based on free school meals, the measure used in the 'Autumn Package', or social class) would show a different pattern of results.

The regression analysis showed that although students in Year 11 did report slightly higher test anxiety scores, the effect was not significant, providing only weak support, at best, for the prediction made by Hodge *et al.* (1997) on the basis of GHQ scores. This finding is consistent however with the theorization that, unlike the findings reported by Hembree (1988), test anxiety scores would not show a decrease during Year 11 due to the high stakes nature of the GCSE examinations. Due to the cross-sectional design of this study, the possibility that year group differences are attributable to a cohort effect

cannot be conclusively eliminated and future research should consider using a longitudinal design by taking multiple measurements of test anxiety across the KS4 programme of study in a single cohort. Descriptive data showed that students for whom English was an additional language reported slightly higher test anxiety scores. However, the regression analysis revealed EAL as non-significant, suggesting that differences in test anxiety scores could be adequately accounted for by other factors in the model, most likely ethnic background, and do not support the prediction of Hodge *et al.* that reported anxiety is higher for students whose first language is not English.

The findings of this research suggest three important directions for future research. First, this work has employed the original North American version of the TAI. Although the basic factor structure of the TAI has been replicated, due to the paucity of test anxiety research in the UK, the appropriateness of this measure for use in the UK educational system is not clear. It should not be assumed that this measure would be appropriate for English speaking students outside of North America. The measure may contain implicit assumptions about testing in a North American context and needs to be thoroughly evaluated for use in the UK.

Second, arguably the most important feature of test anxiety, a systematic is its effect on assessment performance. While Flaxman *et al.* (2002) have shown that the grades of students in Key Stage 4 improve following a reduction in test anxiety and a systematic analysis of the effects of test anxiety on performance is required. This should include the effect of both trait and state test anxiety on the performance of students in both Years 10 and 11 in the different types of examinations taken in KS4 (internal school examinations, modular GCSE examinations taken in Years 10 and 11 and terminal GCSE examinations) and in different subjects.

Third, as the construct of test anxiety will be new to many university academics and Key Stage 4 schoolteachers in the UK, it is not clear how test anxiety will fit into the UK educational context. Some exploratory work is required to examine how teachers and other key personnel involved in educating Key Stage 4 students construct the issue of anxiety in assessment contexts and how they are supporting students in terms of classroom practices and school policies. An additional issue is whether highly test anxious students would be considered to have Special Assessment Needs under the UK Joint Council for General Qualifications (JCGQ) code of practice for *Access Arrangements and Special Consideration* (JCGQ, 2005) and what these might be.

Acknowledgements

This research was supported by a bursary made to the author by the University of Manchester. The author would like to thank Dr Kevin Woods along with two anonymous reviewers for their helpful comments over the initial draft of this paper, Dr Graeme Hutchison for statistical advice and the cooperation of the staff at the seven schools where data were collected. Without their help and assistance, this study would not have been made possible.

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Received 19 May 2005; revised version received 17 May 2006