

Trait anxiety and final degree performance at the University of Oxford

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Abstract A questionnaire was administered to 1,929 applicants to Oxford University, including measures of trait anxiety, behavioural response to examinations and to breakdown in relationships. 635 of these applicants were admitted to the university and of these, 383 also responded to a questionnaire administered 4 years later, just before their final examinations. The classification (first, upper and lower second, third class) and marks in the final examinations were obtained and the relationship between the personality measures and academic performance were calculated. Women showed higher anxiety scores than men at both times of testing. Women who obtained the best (first class) degrees scored significantly higher on anxiety than those who performed less well. In contrast, there was no such difference in men. Explanations for anxiety having a facilitatory effect on academic performance of women at Oxford University are proposed.

Keywords Academic performance · Oxford University · Undergraduate students · Sex differences · Anxiety

Introduction

In the UK, having attended Oxford University (or Cambridge) has for a very long time been seen to be a positive factor in obtaining prestigious employment: a disproportionate number of members of the senior professions, and indeed of Prime Ministers, has been educated at these universities. For this reason, the UK Government and also the media have a strong interest in factors which affect admission to and achievement at these universities. One factor that has received attention is the relatively poorer performance of women in

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terms of gaining first class degrees at Oxford and Cambridge. This contrasts with performance at both 16 and 18 years in school examinations in the UK (GCSEs and A-levels) where girls now outperform boys in all subjects. The results at all universities combined show that women obtain a higher proportion of 'good' degrees (first or upper second class) than men (WWW. HESA.ac.uk). However, men obtain a slightly higher proportion of first class degrees (In 2007, 12.21% compared with 11.33%; $n = 244,195$). At Oxford and Cambridge and some of the other highly selective universities this difference is greater (McCrum 1994; Spear 1997). It can partly be ascribed to the different choice of subject by men and women (Surtees et al. 2002): more men for example do Chemistry, more women read English, and Chemistry is given a higher proportion of firsts. However, this does not explain all of the difference and in certain subjects, notably English Language and Literature at Oxford, this 'gender gap' has been particularly pronounced. The 'gender gap' occurs in samples of students where there is no difference between the sexes in verbal IQ (a predictor of academic success; Mellanby et al. 2000) and so is likely to be related to personality or situational factors. One of the explanations put forward for men's higher proportion of first class degrees in subjects where the examination papers require three or four essay answers in 3 h has been that they write more confident answers and that this characteristic is rewarded by examiners (Spurling 1990; Martin 1997; Mellanby and Rawlins 1997). Mellanby et al. (2000) measured self-esteem and self-efficacy in men and women taking Oxford Finals because such characteristics might be expected to impact on the style of written answers. Men did score significantly higher on these measures but they did not, however, predict examination achievement and hence were unlikely to be the cause of the gender gap. The authors also measured two types of behaviour which might be expected to have deleterious effects on exam performance: responses to the break-up of an important personal relationship and types of behavioural change during exams (e.g. in sleep pattern or eating). Although these measures did not predict exam performance in that paper, these measures have been used in the present larger study in order to look further at their relation with anxiety and to see prospectively whether they relate differently to exam performance by men and women students.

There is a widely held belief that anxiety is detrimental to academic performance (see e.g. Benjamin et al. 1981; Zeidner 1998). Most work on this subject has concentrated on state rather than trait anxiety. Personality traits are considered to be relatively stable characteristics of a given individual. Personality states, in contrast, involve the manifestation of a particular characteristic under a specified set of circumstances—e.g. exam anxiety. The success of the original learning process is of course highly relevant to the ability to draw upon this learning in an exam situation and so trait anxiety needs also to be considered. Models of the learning process (Biggs 1985, 1993) usually include personality factors as interacting with situational factors in determining the approach to learning that is adopted. One reason that high anxiety would be expected to impair learning is that it is believed to promote a 'surface' (reproducing) rather than a 'deep' (seeking meaning) approach to learning (Fransson 1977; Tooth et al. 1989; Trigwell and Ashwin 2003). A deep approach is generally considered to be more appropriate to university studies and there is some evidence that students using a deep approach attain better examination results (Ramsden and Entwistle 1981; Watkins and Hattie 1981; Entwistle and Ramsden 1983; Prosser and Trigwell 1999; Trigwell and Ashwin 2003) and better performance on coursework (Duff 2003).

Studies of the relationship between anxiety and examination performance usually look either specifically at exam anxiety (e.g. Morris and Liebert 1970; Chappell et al. 2005; Bors et al. 2006) that is, an example of state anxiety, or neuroticism (an example of a trait)

as measured either by the Eysenck Personality Inventory (EPI) or by the use of the Big Five inventory which measures neuroticism, agreeableness, conscientiousness, openness to experience, and extraversion (e.g. Duff et al. 2004; Chamorro-Premuzic and Furnham 2003; Trapmann et al. 2007). Those using personality inventories are looking at the effect of factors that are considered to be stable components of personality—traits. However, neuroticism, though related to trait anxiety, is not the same thing (Eysenck 1947, 1960; Gray 1971, 1987).

State anxiety is considered to be made up of two components: ‘worry’ and emotionality (equivalent to Eysenck’s Neuroticism). It has been shown that it is worry specifically that interferes with performance (Eysenck et al. 2007; Hayes et al. 2008). The attentional control theory of Eysenck et al. proposes that in general, impairment of performance of a task results from anxiety acting on the central executive to reduce goal-directed attention via an increase in stimulus-driven attention, particularly to threat-related stimuli, including internal ‘worry’. Such an explanation is congruent with the proposal that anxiety shifts the learning process to a more surface approach since being stimulus-driven is just what that approach involves.

The influence of trait anxiety on academic performance has been less researched. Trait anxiety can be measured by Spielberger’s inventory (Spielberger et al. 1983) or by a simple visual analogue scale (Martin 1997), and has been shown to interact positively with state anxiety (King et al. 1976; Sorg and Whitney 1992). Thus, those with high trait anxiety have a lower threshold for the activation of the increased vigilance response produced by perceived threat (Matthews and Mackintosh 1998; Mathews and MacLeod 2002) and show greater allocation of attention to threat-related stimuli (MacLeod and Mathews 1988). Hence, in general it would be expected that those who have high trait anxiety would be more anxious in an examination situation. But this would only be the case if they regarded the exam situation as threatening. As Eysenck pointed out in his 1972 paper, “a very intelligent, well-prepared person who scores highly on N” (neuroticism) may not regard the examination situation as threatening, (indeed, s/he may even consider it rewarding) and hence this relationship does not necessarily hold. Furthermore, Eysenck (2007) has found that while anxiety may have a deleterious effect on processing efficiency (effectiveness divided by effort), processing effectiveness itself may be unaffected because compensating strategies can be developed.

Women on average score higher than men on measures of trait and state anxiety and on neuroticism (Martin 1997) and anxiety-related disorders are commoner in women (Maitlin 1996). A simplistic extrapolation from this would be that women would do worse than men in examinations. However, the studies using the Big Five measures have shown that they also score higher on conscientiousness, a factor unrelated to neuroticism, and this, unlike neuroticism, is an important predictor of examination success (see e.g. Duff et al. 2004; Busato et al. 2000; for meta-analyses, see O’Connor and Paunonen 2007; Trapmann et al. 2007). So, given equal academic ability, the direction of any difference between male and female examination achievement is not immediately predictable as the effects of anxiety and neuroticism on the one hand and conscientiousness on the other hand might cancel each other out.

The findings reported in the present paper are derived from a larger investigation, under the chairmanship of Professor Anthony Heath, which had two main objectives: to study factors, including type of school attended and gender, affecting selection of students for Oxford University and to trial a type of entrance test similar to one previously shown not to discriminate in favour of independent school candidates (Mellanby et al. 2009). In addition to the entrance test, the instruments used included verbal and non-verbal intelligence,

cultural capital, learning style, a wide range of social background features and a number of personality measures (Zimdars 2007). The personality measures which we report here were chosen from those used in the previous study (Mellanby et al. 2000) of sex differences in achievement at Oxford University and which would be expected to be related to anxiety. About half of the students that gained entry to Oxford also filled in a further questionnaire in their final term at university and we obtained their final examination results. It was therefore possible to determine the predictive value of measures taken at selection for final academic success and also the relation between trait anxiety near the end of the course and achievement.

Method

Participants

The analysis presented here is based on the Oxford Admissions Survey. This study involved 1,929 applicants for admission to the University of Oxford and the first wave of data collection was conducted during the 2002 admissions cycle with applicants for admission in 2003. Just over one-third of applicants—that is 706 individuals—were successful in the competition for a place at Oxford, and of these 635 took up their places the following year. These Oxford entrants were followed up with a second wave survey in 2006 that was answered by 383 of them. The third wave of data collection concerned the degree performance in their final Oxford University examinations in so far as they were taken in 2006. The first wave survey and the Oxford follow-up survey contained motivational, attitudinal, behavioural, aspirational, approach to learning, and social and cultural capital measures (Sullivan 2001) as well as a timed intelligence test (Heim 1968) and detailed information on the applicants' social background. The anxiety-related measures in the survey are now described in further detail.

Measures

All the personality measures were previously validated and used in the study reported by Mellanby et al. (2000). Anxiety was measured as a self-reported scale ('rate your prevailing mood over the last 3 months') ranging from zero (not at all anxious) to 100 (extremely anxious) (Martin 1997). (This simple measure of 'trait anxiety' was used rather than the well-known inventories (e.g. Spielberger et al. 1983) because for practical reasons it was necessary to restrict the length of the questionnaire and to limit potential stress for participants.) The measure of anxiety was supplemented with information on coping strategies with respect to 'When things go wrong in my family and personal relationships' (see "Appendix 1"). Respondents were also asked to grade their behavioural changes in response to examination stress (see "Appendix 2"). Both these scales were graded on a five-choice Likert scale from 'never' to 'always' and had satisfactory Cronbach's alpha of 0.681 and 0.787, respectively in the present study (*which was considered adequate for research purposes*).

In the following analysis, these measures are broken down by gender and whether the observation was collected in wave I (pre-admission) or wave II (pre-finals) of the survey. Examination marks for first year exams and Finals and degree class in Finals were obtained (with the respondents' written permission) from the relevant Chairmen of Examiners. Degree classes are classified as 'First Class', 'Upper Second', 'Lower Second', 'Third' and 'Pass'. Given the small number of cases where degree performance was below the 'Upper

Second' threshold, we have restricted our analysis to those who obtained one of the top two degree classes. We have also used examination marks deciles rather than the degree class. The decile scale is more nuanced as it uses marks from 40 to 80—with a score of 70 and above usually classified as a First Class degree.

The wave II participants being a subset of the original wave I entrants to Oxford could mean that the means and distribution of their characteristics differed from those in the first wave. For this reason, the comparisons of factors measured at the start and just before Finals are limited to the subset who filled in the second questionnaire. There was no difference in the scores on the 'personality' measures between those in wave I who did not volunteer for wave II and the wave II subset. However, the students in the wave II sample did better than those who did not volunteer for wave II in GCSE (by one point on the total GCSE score) and in Finals decile just the women in wave II two did better (mean marks decile 0.57 ± 0.28 at start v 0.48 ± 0.28 at end; $t = 2.623$, $p = 0.01$) although they performed similarly in the verbal ability test.

Results

Comparison of trait anxiety in men and women

The first step in the analysis is to compare anxiety by gender at different points in the research. We can see from Table 1 that female applicants to Oxford had, on average, an anxiety score that was 7.07 points higher than the mean for their male counterparts. This sex difference in anxiety was similar, although slightly (but statistically insignificantly) reduced, when looking only at those who were admitted to the University of Oxford.

For the wave II participants, Table 1 also displays the anxiety levels during the final year of their degree courses. As observed at admissions level, there is a gender gap in anxiety with female students scoring on average almost 10 points higher than their male peers. Furthermore, while the mean anxiety score for males during their final year mirrors closely their profile at entry, the mean female anxiety score increased from 56.17 to 60.09. Calculation of the difference between individuals' scores in wave I and wave II based only on those who completed both questionnaires indicated that in females only there was apparently a small increase in anxiety over time but this did not reach statistical significance (paired t -test, $p = 0.064$).

Table 1 Mean trait anxiety score by sex and time

	<i>n</i>	Mean anxiety score	SD
All applicants; wave I (2002)			
Male	851	49.90**	24.54
Female	1,059	56.97	22.81
Accepted applicants only; wave I (2002)			
Male	346	51.30*	24.76
Female	360	56.17	22.43
Accepted applicants only; wave II (2006)			
Male	184	50.40**	1.73
Female	199	60.09	1.59

Statistically significant sex difference: ** $p < 0.001$;
* $p < 0.01$ (t -test)

Exam-related changes in behaviour

The reported changes in behaviour at exam times (from responses given at interview time) showed that women recorded very significantly higher scores on all items (Table 2).

Among Oxford entrants, female students were also more likely to report that they had been upset by a major traumatic event such as bereavement or illness before or during exams: while 44 out of 345 males, that is 12.7 per cent had experienced such an event, 21.4 per cent—or 77 out of 359—females reported having been affected (chi-squared, 7.368, $p < 0.01$).

Exploring the correlation between initial trait anxiety and the response to examination stress questionnaire showed one interesting difference between males and females: while for both there was a significant correlation between initial anxiety and exam stress, this relation was no longer present for females at the end of the course (Table 3).

Response to breakdown in a relationship

The effect of breakdown of an important relationship (during schooldays) on student behaviour, for those admitted to Oxford, is shown in Table 4: females at Oxford were slightly (and significantly) more likely to throw themselves into their work and to talk to friends about it than men. There was no significant difference in the rating of the other changes in behaviour (being unable to work, throwing themselves into extracurricular activities, or thinking about the problem).

Looking at the correlation between these measures and the trait anxiety showed that the putatively positive coping strategies of talking to friends about the problem or throwing him/herself into work bore no relation to anxiety either measured at interview or near the end of the course, in either sex. Thinking about the problem ('ruminating') was significantly related to anxiety at the start, in both sexes, but not to anxiety at the end. Interestingly, there was a difference between the sexes in the correlation between anxiety at the

Table 2 Reported behavioural change during exam time in those accepted for Oxford

Measure	Sex	Mean	SD	<i>p</i> (<i>t</i> -tests)
Difficult sleep	Male	2.06	1.02	<0.0005
	Female	2.37	1.05	
Work late	Male	2.08	1.10	<0.001
	Female	2.36	1.09	
Work early	Male	1.61	0.89	<0.0005
	Female	1.95	0.98	
Eat less regularly	Male	1.74	1.07	<0.0005
	Female	2.04	1.10	
Eat more	Male	2.03	1.10	<0.0005
	Female	2.57	1.15	
Eat less	Male	1.73	1.02	<0.003
	Female	1.96	0.99	
Feel ill	Male	1.96	1.00	<0.0005
	Female	2.33	1.03	
Feel upset	Male	2.01	0.98	<0.0005
	Female	2.60	1.01	

For exact wording of items see "Appendix 2"

Table 3 Correlation coefficients between measure of behavioural change at exam time (measured in 2002) and anxiety by sex and time

	Males	<i>n</i>	Females	<i>n</i>
All applicants (2002) Wave I	0.381	851	0.359	1,059
Accepted applicants only (2002) Wave II	0.446	346	0.392	360
Accepted applicants only (2006) Wave II	0.269	184	0.082*	199

The measure of behavioural change is the sum of all scores on all the questions in the exam stress questionnaire (see “Appendix 2”)

All sex differences are statistically significant at $p < 0.001$ except * which is N.S.

Table 4 Response to breakdown of a relationship in those accepted for Oxford

Measure	Sex	Mean	SD	<i>p</i>
Throw self into work	Male	2.89	0.94	<0.0005
	Female	3.12	0.93	
Talk to friends	Male	2.49	1.11	<0.0005
	Female	2.94	1.12	
Unable to work	Male	2.59	0.86	N.S.
	Female	2.68	0.76	
Think about problem	Male	3.20	1.00	N.S.
	Female	3.20	0.95	
Extra-curricular activities	Male	3.00	1.12	N.S.
	Female	2.98	1.12	

For details of the questionnaire see “Appendix 1”
Males: $n = 345$, Females = 361

end and being unable to work in men ($r = 0.203$, $p < 0.001$) but no correlation in women ($r = 0.043$, $p = 0.569$).

Anxiety and exam performance in first year of university

The exams in first year are mainly not classified (first, second etc.) therefore the male and female performance was compared on the basis of marks decile. Males did significantly better than females on this measure. In males, there was no significant correlation between trait anxiety at wave I (and the trend was positive, that is lower anxiety, better performance since top decile is 1) while in contrast there was a significant negative correlation in females (higher anxiety, better performance Table 5).

Anxiety and final degree achievement

An exploration of final degree class and trait anxiety shows that female students who obtained a First class honours degree scored significantly higher on wave II anxiety than those who scored less highly (Mann–Whitney *U*-test, $p < 0.005$). However, there was no such difference in men (Table 6). This finding is further illustrated when comparing the distribution of wave II anxiety scores by gender among those who achieved First class honours degrees in 2006. While the majority of females with firsts scored higher than 60 on the anxiety scale, the scores for males were reasonably normally distributed about the mean. This was further explored when comparing degree outcomes obtained by women and men matched on their anxiety scores. The likelihood of obtaining a particular class of

Table 5 Relation between trait anxiety and first and final year examination marks (decile)

Sex	Correlation between first year exam decile and finals decile. Pearson <i>r</i>	Mean decile in first year exams	Correlation between first year exam decile and wave I anxiety pearson <i>r</i>	Mean finals decile	Correlaion between finals decile and wave II anxiety pearson <i>r</i>
Male	0.555***	4.33 (± 2.92)**	+0.115	4.43 (± 3.02)*	-0.046
Female	0.523***	5.16 (± 2.79)	-0.141*	5.10 (± 2.74)	-0.183*

Correlations significant at *** $p < 0.001$, * $p < 0.05$

Sex differences significant at ** $p < 0.01$, * $p < 0.05$; (*t*-test) (deciles: top = 1, bottom = 10)

Table 6 Trait Anxiety levels in final year by class of degree

Class of degree	Males	Females
First	55.0 (± 23.3)*	70.3 (± 19.6)*
Second (2.1)	49.1 (± 22.5)	56.8 (± 23.3)

Trait Anxiety was recorded on a 0–100 scale (see “[Methods](#)”)

Values are given \pm SD

* Significant sex difference, $p < 0.05$. (*t*-test)

degree for those with an anxiety score of greater than 60 was the same. However, men at the bottom level of anxiety appeared to be more likely than women at that level to achieve First class degrees—six out of 15 males who scored below 20 on anxiety got firsts whereas only one in nine females did.

We repeated the analysis of anxiety and degree outcome using final degree class decile rather than the more crude classification into degree classes. Here, we found that there was a weak negative correlation between anxiety scores during wave II and degree marks decile in females (Pearson’s $r = -0.183$, $p = 0.024$) but no such relationship in males (Table 5). (*Since the top decile is 1 and the bottom is 10, the correlation is negative.*) This indicates that as with the first year exam, trait anxiety has a positive effect on finals performance, but only in females.

Discussion

The main finding of this study is that higher trait anxiety is not necessarily deleterious to performance in Final Examinations by Oxford undergraduates. Furthermore, in the sample of women at Oxford who filled in the questionnaire at the end of the course, contrary to general expectations, if anything there is a positive relationship between trait anxiety and high level performance. Conversely, in men there is no such relationship. This sample of the students (wave II; a subset of those who filled in the first questionnaire) had slightly higher GCSE total sum scores and did better in Finals than those who did not fill in the later questionnaire. This suggests that students who were ‘good examinees’ were more likely to volunteer to take part at wave II.

While anxiety scores in the women are generally higher than for men, and women report experience of more negative events, it is notable that the women do not respond to the break-up of personal relationships with more behaviours likely to impair academic performance, and indeed were more likely to throw themselves into their work and talk to

their friends about the problem. Both of these behaviours could be considered to be good coping strategies. The finding that trait anxiety at the end of the course correlates positively in men with the earlier exam-related response of being unable to work, but definitely does not correlate in women, hints at a subtle difference between the sexes in the nature of anxiety measured at the end of the course. Also, in women, there was no longer a correlation between earlier measures of exam stress and trait anxiety while this relation was still present in men.

The possible positive effect of trait anxiety is not necessarily relevant to all university students. Those at Oxford and Cambridge constitute a small minority of undergraduates at UK universities. They have been highly selected for their attainment in school examinations (and also by interviews by academics in their chosen subjects for study at university). They will almost all have obtained at least 3 A grades in A-levels, whereas the students at most other universities will have lower attainment. Furthermore, the changes in reported affect over the 3 years of study may well be different since the nature of teaching at Oxford and Cambridge differs from that at most universities, especially in arts subjects: the major learning experience involves independent reading, essay-writing and 1 h tutorials usually for just two students with a university teacher.

It has frequently been proposed that the reason that women do not obtain as high a proportion of first class degrees as men in some subjects at highly selective universities is that the women are more anxious and that this anxiety impairs their ability to perform well in examinations. However, it must be remembered that the previous high performance of Oxford undergraduates means that they are likely mainly to belong to the group proposed by Eysenck (1972) as well-prepared and well able to cope with the exam situation. But this does nothing to explain why in the present study it is the women in whom first class degrees are associated with higher levels of trait anxiety. Nor does it shed any light on why a lower proportion of women obtain first class degrees at Oxford though it suggests that higher trait anxiety levels are not the answer. Previous studies (Mellanby, and Rawlins 1997; Mellanby et al. 2000) suggested that the cause was more likely to reside in the 'system' than in the characteristics of the individual candidates.

Turning now to possible previous evidence that could support the finding that higher performance can be associated with higher trait anxiety levels, at least in high performing students, we need to consider factors that affect the effectiveness of the original learning. Educational performance is measured either by continuous assessment or by written, away from the books, examinations. In both cases, the efficiency of the learning process and the ability to organize material and relate it to previous knowledge is important. Trait anxiety will be relevant to the original learning process and also presumably to the rehearsal and re-organization that occurs in maintenance of the memory. It is well known that events with an emotional flavour are better remembered than those without, and there is the traditional (Yerkes and Dodson 1908) inverted U-shaped curve relating arousal to learning. Trait anxiety is expected to bear such a relation to initial learning—and hence assuming that a sample does not contain those who are morbidly anxious, we might well expect that the best memories might be formed by the more anxious. This could be related to the assertion of both Eysenck (1972) and Gray (1987) that the most successful academic performers would be neurotic introverts. Denny (1966) carried out an experiment on the effect of trait anxiety and intelligence on concept formation from groups of presented symbols. In this he found that the concept formation was actually facilitated in high intelligence students if they scored high on trait anxiety but impaired by high anxiety in low intelligence students. It can be argued that processes such as those involved in that study would be highly relevant to the learning tasks carried out by university students and

hence presumably to their recall under examination conditions (or indeed continuous assessment). While it has been proposed that this higher anxiety level would be likely to be associated with a more surface style of learning, this does not need to be deleterious to performance of those with good study habits who convert their surface-acquired information into a deeper form (Chalmers and Volet 1997).

A further possibility to explain the finding that high trait anxiety-rated students can obtain first class degrees is a state-dependency effect on memory—memory retrieval is best where the conditions under which something is learned match the conditions where its retrieval is tested (first shown by Overton (1964) with respect to drug state and extensively expanded by Bower (1981) in the context of mood states; and related to depression by Clark and Teasdale (1982)). Hence if we regard exams as inevitably somewhat stressful, then there will be more congruence for individuals who rate highly on trait anxiety. The evidence that retrieval of emotionally charged material is better under a congruent mood state may be taken to support this view. Thus, Clark and Teasdale (1982) showed that low mood related to time of day increases retrieval of depressing memories and MacLeod and Mathews (1988) (and see Mathews and MacLeod 1994) showed that the allocation of attention to threat-related stimuli was greater in high than low trait anxiety individuals.

In the 1960s and 1970s Spielberg and colleagues carried out several investigations of the relationship between state and trait anxiety and academic performance in university students. Most of these studies were on relatively short term retrieval of learned information but they did also look at the relation with grade point average and with final examinations. In general they found students with high trait anxiety showed lower academic performance than those with low trait anxiety. However, they found an interesting relation between intelligence and performance, which could be relevant to the results reported here in Oxford undergraduates. They divided their students into five groups, each containing approximately 20% of their sample, by “intelligence” (College entrance SATs). They found that for the group at the top of the range there was no difference between those with high and low trait anxiety. Furthermore, when they restricted the analysis to a comparison of those whose SAT score was above the 95th percentile with those in the 91st to 95th percentile, they found that the very top students with high trait anxiety actually performed better than those with the same intelligence but scoring low on trait anxiety Denny (1963, 1966; and see Spielberg 1966). Another relevant study was carried out by Spielberg (1966) using a fairly short-term memory task for complex shapes. He found that with relatively easy items, high anxiety students scored worse than low anxiety students but with the most difficult items the high anxiety students scored better than them. Interestingly, Cassady and Johnson (2002) found that while high cognitive test anxiety interfered with examination performance, intermediate levels of test-related physiological arousal were associated with better exam performance. These findings could be related to the observation that the position of the optimum in the Yerkes-Dodson curve is related to task difficulty (Broadhurst 1959). For very highly intelligent students, presumably, other things being equal, any given task is likely to be less difficult than for less intelligent students. Hence a higher level of anxiety may still be optimal in the brighter students. A similar interaction between intelligence and neuroticism was found in the performance of military recruits (Perkins and Corr 2006) and in financial managers in business—indeed, in the latter case, in the most intelligent, only, high neuroticism predicted high level performance (Perkins and Corr 2005).

Covington and Omelich (1986) showed that trait anxiety had a weak negative relation to early exam performance at University but that what was really important in determining performance was a student’s perceived concept of ability. The direct importance of both

these factors was, however, subsumed in the effect of this previous exam performance when their effect on subsequent exam performance was investigated. Hence they were only relevant as indirect factors. In the present investigation, performance in first year exams predicted performance in final exams and while trait anxiety was unrelated to performance in males in either set of exams, in females it remained positively related at both times.

So, while the present study has shown that high state anxiety is compatible with top performance at Oxford in Final examinations in both sexes, it does not explain why anxiety is only positively related to degree class in women: men with low trait anxiety are as likely as those with high trait anxiety to obtain firsts, but women with low trait anxiety are less likely to get firsts. Finally, it must be pointed out that the arguments are based on a single measure of trait anxiety (Martin 1997) and that since this is self-report, it is possible that what we are measuring is the relative willingness of women as against men to admit to feelings of anxiety, rather than actual trait anxiety.

In the present study, we were of course looking at those who actually obtained a classified 'good' degree (class 1 or 2.1 in final examinations. We are well aware that extreme examination stress response can lead to 'blocking' and such students would be likely to have dropped out of the course either before Finals or possibly while taking the papers. Such extreme responses could be considered an example of the freeze response of the flight, fight, freeze response to panic fear, which Gray and McNaughton (2000; and see Perkins et al. 2007) regarded as separable from the system involved in increased vigilance which characterizes anxiety. It would be expected that these extreme responses to stress would be commoner among those scoring high on trait anxiety due to the interaction between state and trait anxiety. Thus, high trait anxiety is most unlikely always to be a beneficial characteristic and the more extreme effects seen in morbidly anxious students probably explain the general impression that anxiety is bad for academic performance.

Appendix 1

Responses one of: 'never', 'rarely', 'sometimes', 'often', 'always'

When things go wrong in my family and personal relationships:

I find myself unable to work

I throw myself into my work

I think all the time about the problem

I continually talk it over with friends

I throw myself into sport/extra-curricular activities/hobbies

Appendix 2

Responses one of: 'never', 'rarely', 'sometimes', 'often', 'always'.

Please think back to when you last took exams and try to answer the following questions. The questions concern what you did in the study period running up to the exams and during the exams themselves.

I had difficulty sleeping

I got much less sleep than I am used to by staying up late at night studying

I got much less sleep than I am used to by getting up very early to study

I did not eat as regularly as I am used to

I ate more than usual
 I did not eat as much food as I am used to
 I felt ill or out of sorts
 I felt distressed/upset

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