Examination Anxiety in Primary, Secondary and Sixth Form Students

Paper 3: Causes and consequences of test anxiety in Key Stage 2 pupils: The mediational role of emotional resilience

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Abstract

Deleterious effects of Standardized Achievement Tests, such as those taken at Key Stage 2, on the emotional and physical well-being, educational experiences and outcomes of primary school pupils in England have recently been documented (e.g. Tymms & Merrell, 2007), yet there is a lack of empirical evidence supporting these claims. This paper reports on the outcomes of a mixed methods study, involving 120 Year 6 pupils and their teachers, from 3 English primary schools, which examined pupils’ experiences of SATs and SAT related anxiety as well as the extent to which differences in pupils’ resilience moderate the effects of test anxiety. Using hierarchical regression analyses to control for differences in pupils’ general ability, it was found that poorer SAT grades in English, maths and science were significantly associated with higher levels of self-reported test anxiety and lower levels of resilience and that the negative effects of worry, off task behavior and autonomic reaction components of test anxiety were moderated by differences in pupils’ resilience. Qualitative data provided further evidence of SAT related anxiety and its various sources, but also highlighted both positive and negative attitudes towards the tests.

Introduction
The ‘high stakes’ testing agenda in English schools

Since the education reforms of 1990s, aimed at improving standards of education in English schools, pupils’ test and examination performance have been used as indicators of school effectiveness. School’ examination results are organised into published league tables by the Department for Children, families and Schools (DCFS). Primary schools are categorised on the basis of Key Stage 2, Standardised Assessments Tests (SATs) taken by children in Year 6, the final year of primary schooling, which assess pupil performance relative to National Curriculum (NC) normative standards of achievement. Performance thresholds are established and failing (sic) schools threatened with financial sanctions and/ or regime change. The minimum standard required of English primary school is for 85% of pupils to achieve NC level 4, the expected standard for an 11 year old pupil, in English, Mathematics and Science.

Consequences of accountability by a high stakes testing agenda

The ‘audit culture’ in evidence across all stages of compulsory education in England, characterised by the above practices as well as Office for Standards in Education (Ofsted) inspections and centrally imposed curriculum initiatives, has become the subject of much concern, critical discussion and debate (Ball, 2003; Frankam &
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Howes, 2006; Torrance, 2004). More recently, there has been particular concern over their effects at primary school level where various reports have highlighted the deleterious consequences of evaluation for teaching and learning and for the well-being and motivation of both teachers and pupils. Such outcomes are claimed to result from the stress associated with the external pressure on schools and individual teachers to conform and perform (e.g. Harlen & Deakin-Crick, 2003; Harlen, 2007; Tymms & Merrell, 2007).

Troman (2008), performed a qualitative analysis of primary teachers’ experiences of working in an education regime so bound up in performance and accountability. Teachers found themselves under considerable pressure, often resulting from a feeling of personal accountability for the performance of pupils, amongst whom, for many reasons, there is a huge variability in potential making for a very uneven playing field. A number of other reports have discussed the impact of the imposition of the NC and SATs on the school curriculum, pedagogy and assessment practices (e.g. Harlen & Deakin-Crick, 2003; Harlen, 2007; Tymms & Merrell, 2007). Pressure experienced by teachers to achieve targets resulted in practices such as ‘teaching to the test’, repeated testing, ‘coaching’, whole-class teaching, and narrowing the curriculum focus range of learning outcomes, which could be stressful and de-motivating to pupils. Thus, the educational reforms originally intended to promote achievement can be seen, in themselves, to be problematic. Improving test and examination performance at the expense of educationally enriching activities which are not tested or examined resulted in the manipulation of targeted standards and a superficial, non-transferable learning.

The majority of studies of the effects of high stakes testing regimes in the UK and other countries have focused on the pupils’ rather than the teachers’ experiences. The accumulated evidence seems to be that the effects on pupils are diverse, and often far-reaching and negative. In addition to the adverse consequences of altering the curriculum and teaching practices to accommodate preparation for SATs, are those resulting from pupils’ anxieties specifically related to the process of undertaking exams; the most notable being the impact on exam performance. The anxiety-performance association, evident across a range of evaluation contexts, has been extensively documented (e.g. McDonald, 2001). In the context of formal education, a body of evidence for the phenomenon has emerged primarily, though not exclusively, from research conducted in the USA, across a wide spectrum of students from primary school to college/university levels. A fair proportion of findings come from studies of high school students taking their final year exams. However, there is a dearth of evidence relating to primary school age children particularly in English Schools. This noticeable gap is of some considerable concern, given the high stakes nature of Key Stage 2 SATs with their implications for academic progression to high school and the potential vulnerability of young children lacking experience of high stakes testing.

Tests and examinations are consistently reported by children and adolescents as worrisome, anxiety-provoking and stressful events (McDonald, 2001; Owen-Yeates, 2005). Pupils frequently become concerned with the consequences of failure where their sense of self-worth has become bound up with external achievement, where there is the possibility of negative judgment from others, such as family members, and where educational and/or occupational aspirations rest on achievement. In a study of test anxiety in primary school children preparing for their Key Stage 2 (KS2) SATs (Connor
2001; 2003), teachers reported that children showed signs of stress and anxiety beyond what would be considered as understandable or typical and voiced concerns over potential failure and the consequences for subsequent academic setting in secondary school. This is illustrated beautifully by one of the year 6 pupils participating in a qualitative investigation into pupils’ SAT related anxiety in a London primary school (Reay & Willam, 1999). ‘…you have to get a level like a level 4 or a level 5 and if you’re no good at spellings and times tables you don’t get those and so you’re a nothing.’ (p345). It has been suggested that the anxieties experienced by children may, in part, be transmitted by teachers overly pressured by such things as target setting and the school’s league table position. Children realise that test results, especially those of SATs, are perceived by teachers as important and so they come to assume an importance in the minds of the children (Connor, 2002; 2003; Pollard, Triggs, Broadfoot, McNess & Osborn, 2000). Despite the fact that some students demonstrated awareness that SATs were a means of judging the school, Pollard et al (2000) found that two-thirds of students in their study expressed a conviction that the test results would be used as an evaluation of them. However, a survey conducted by the National Union of Teachers (Neill, 2002) revealed that teachers held both positive and negative views regarding pupils’ experience of SATs. While teachers believed that too much pressure was placed on children, some of which coming from parents, they also referred to potential benefits to be had from testing in that they could help prepare children for secondary school.

These findings represent a small, but potentially significant, literature suggesting how the accountability by high stakes testing agenda in English primary schools, or at least the way it is currently realised in the context of KS2 SATs, has a negative impact on children’s learning, and often results in an unnecessary, and possibly debilitating, degree of pressure. As Tymms and Merrell (2007) note, however, these studies often use small, and possibly unrepresentative, samples and test-related stress or anxiety is often not the primary or sole focus of research. Thus, the evidence available from studies of the effects of the KS2 SATs regime on English school children is currently very limited indeed. Thus, the present study into the experience and consequences of test anxiety in primary school children could be considered long overdue.

The test anxiety construct

Although test related stress and anxiety in children has generally been ignored in the UK until relatively recently, there is large international literature exploring this phenomenon using the test anxiety construct, which provides a useful theoretical context to the present study. Test anxiety refers to the appraisal of a test or other evaluative situation as threatening and consists of distinct cognitive, affective-physiological and behavioural components (Zeidner & Mathews, 2005). The cognitive component refers to worrisome thoughts and concerns about the consequences of failure, the affective-physiological component to physical sensations that accompany anxiety (trembling, headaches, etc.) and the behavioural component to actions indicating a lack of task focus during a test such as playing with a pencil, looking around the room and so forth. The origins of test anxiety lie in the psychology of individual-measurement and the vast majority of literature has used quantitative measures of test anxiety, however qualitative approaches have proved useful in accessing the situated...
and contextual features of the test anxious experience (Anton & Lillibridge, 1995; Putwain, 2009).

The test anxious pupil may have difficulty in concentrating during a test, and in reading and understanding test instructions and questions; they may become easily distracted, and experience problems in recalling learnt material (King, Ollendick & Gullone, 1991). Not surprisingly, highly test anxious children are more likely to underperform compared to their low test anxious counterparts (Hembree, 1988; Owens et al., 2008). Literature reviews have indicated that test anxiety rises steadily throughout the early years of schooling, which may be attributable to factors such as the ever increasing pressure from parents and teachers, cumulative experiences of failure, the increasing complexity of learning materials as well as an age-related increase in the accuracy of reporting anxiety (McDonald, 2001; Zeidner, 1998). Gender differences emerge in 3rd to 4th year of schooling with female pupils reporting higher test anxiety than males (Wigfield & Eccles, 1989); a robust effect that persists throughout secondary school and into higher education (Putwain, 2007).

Transactional models of the anxiety-performance outcome process (e.g. Endler & Parker 1992; Lazaraus, 1999; cited in Zeidner & Mathews, 2005) regard test anxiety as a product of an interaction between an individual’s disposition (e.g. personal traits such as optimism/pessimism, self-efficacy, self-esteem) and the perceived threat of the situation encountered. The appraisal of a test as threatening is more likely when a pupil is overly concerned about social evaluation (Zeidner & Matthews, 2002), has low competence beliefs (e.g. Chamorro-Premuzic, Ahmetoglu & Furnham, 2008; Goetz, Preckel, Zeidner & Schleyer, 2008), more avoidant motivation (e.g. Chouinard & Roy, 2008; Guay, Marsh, Senécal & Dowson, 2008) and when the expected outcome is failure (e.g. Pekrun, Frenzel, Goetz & Perry, 2007). Transactional models also emphasize that the association between test anxiety and performance is cognitively mediated. Therefore, the inverse relationship between test anxiety and achievement would be stronger for students who have, for example, ineffective coping strategies, such as avoidance (Söber, 2004), more negative cognitive appraisals, such as a tendency to catastrophise (Putwain, Connors & Symes, 2008), and more unhelpful metacognitive beliefs, for example, that worry helps coping (Mathews, Hillyard & Campbell, 1999). These variables have been found to moderate rather than mediate the effects of test anxiety through their interaction with its specific components. For example, catastrophising was found to interact with the worry component (Putwain et al, 2008) and task orientation and preparation (as coping strategies) were associated with the test anxiety components of worry and emotionality in female students (Stoer, 2004). Moreover, it is argued that the occupation of information processing resources by worry and intrusive, negative, self-referent thoughts impacts negatively on performance as a result of cognitive overload and distracting attention away from the task (Zeidner & Matthews, 2002). These authors have also promoted a self-regulatory theory of test anxiety which describes how such negative interactions with the testing situation, that are more likely to result in failure (either real or perceived), have further repercussions for how individuals would approach and appraise such encounters in the future.

Findings in support of the transactional model of test anxiety have come from studies of test and performance anxiety in a broad range of contexts (e.g. sports,
computers, maths, etc.) but are almost exclusively derived from studies of older children and adults (e.g. see Zeidner & Matthews, 2002). Thus there is a lack of understanding of how this model may be applied to younger children in the context of high stakes examinations. The present study, with its focus on the mediated test anxiety-performance process in primary school children, thereby, makes an important contribution to the literature in this regard.

**Resilience as a potential moderator of the test anxiety – performance relationship**

As outlined above, previous studies examining cognitive processes that mediate the association between test anxiety and performance, have tended to examine individual differences in either cognitive interpretations of anxiety (e.g. catastrophising) or in the cognitive resources individuals might use to manage anxiety (e.g. coping strategies). The present study focuses on the latter, however, rather than examining coping strategies, we have instead introduced resilience as a potential buffer of SAT related anxiety. One factor influencing the rationale for this is that there are identifiable links between resilience and a number of key concepts, such as competence, agency, autonomy, emotional regulation, social competence and self-esteem (Rutter, 1979; Garmezy & Rutter 1983; Masten, Morison, Pellegrini & Tellegen, 1990) that have been consistently associated with more adaptive responses to stressful circumstances such as those encountered in performance and testing situations. Thus, there is some justification for the assumption that test anxious pupils who score higher on measures of resilience would achieve superior test results compared to their less resilient, test anxious counterparts.

Recent conceptualizations of resilience originate in psychiatry and clinical psychology where the term was adopted to account for positive adaptation in high risk populations (Garmezy, 1985). The earlier definitions of resilience emphasized a strong connection with competence, e.g. ‘manifestations of competence in children despite exposure to stressful life circumstances’ (Masten et al, 1990; p 237), others have emphasized its importance in positive adaptation, e.g. ‘the capacity for positive adaptation in the face of extreme stress or adversity’, ‘stress resistance’ or the ability to ‘bounce back’ (Goldstein, 2005). Core determinants in identifying resilient individuals according to these earlier conceptualizations are the severity, extent and duration of the challenges or adversities they have overcome (Luthar, Cicchetti & Becker, 2000). A prolonged debate within the resilience literature has presented a barrier to achieving consensual definition of the construct. Some theorists have adopted a position that views resilience as the *outcome* of an individual’s exposure to severe and/or prolonged adversity. Resilient individuals would be those who, despite the odds stacked against them, show positive adaptation by achieving appropriate developmental norms and milestones. Gaining an understanding of the transaction between organismic and environmental factors that have contributed to the resilient individual’s ‘survival’ to be studied using retrospective methods, traditionally considered unreliable. Nevertheless, findings of such studies underpin major theories of the nature and process of resilience. An alternative position that has emerged more recently, is one that regards resilience as a dispositional resource constituted by a number of behavioural, attitudinal, physiological and temperamental characteristics. Transactions between those characteristics and the individual’s environment would result in positive outcomes
Despite severe risk exposure. This latter approach lends itself more readily to the operationalization of the resilience construct and for the nature and process of resilience to be studied in more detail in a variety of stress inducing contexts, which has led to the development of a number of psychometrically validated resilience scales.

Over the last decade there have been several significant developments concerning the construct of resilience that have resulted in a shift away from the original focus on its role in overcoming severe adversity to its promotion as an immensely valuable personal resource enabling positive adaptation to more normative and everyday life challenges (Newman & Blackburn, 2002; Sun & Stewart, 2007). A particularly favourable attribute of the concept, that has undoubtedly contributed to its widespread appeal, is its emphasis on positive human characteristics and positive outcomes. The ‘salutogenic’ perspective (Bernard, 2005) emphasises the aspects of the resilient disposition such as competence that contribute to coping, health and wellbeing. This newer perspective promotes the enhancement of protective factors in the lives of all children regardless of the presence of risk.

Such theoretical developments have led to the adoption of the resilience concept in disciplines such as health and social work where it is regarded as a valuable focus for intervention (Sun & Stewart, 2007). Only very recently has the concept been introduced within the educational domain where programmes aimed at fostering resilience in the lives of children are now being introduced into a number of schools in Scotland (Newman & Blackburn, 2002) and in England as part of their respective ‘Health Promoting Schools’ and ‘Healthy Schools’ initiatives. A further offshoot has been the appearance of several scales to measure resilience. However, there is huge variability amongst the scales in regard to how resilience has been conceptualized and may include measures of personal resources such as self-esteem, problem solving, prosocial behavior, communication and cooperation, competence, mastery, social relationships and support, and emotional disposition. Using exploratory and confirmatory factor analysis, Prince-Embury, 2005, organized a range of such resources into three distinct scales, two of which comprise three subscales and one comprising of four. These are: Sense of Mastery, comprising optimism, self-efficacy and adaptability; Sense of Relatedness, comprising trust, support, comfort and tolerance; and Emotional Reactivity, comprising sensitivity, recovery and impairment. It is this conceptualization that has been adopted in the present study.

These latter developments have provided a further incentive to explore the nature and scope of the resilience concept across a broader range of stress inducing contexts. The high stakes KS2 SAT context provides an appropriate avenue for such an exploration and thus an additional rationale for the inclusion of this variable in the present study. It is argued here that the personal resources such as mastery, adaptability and emotional stability, that combine to produce resilience would buffer the effects of test anxiety on SAT performance outcomes. This could occur as a result of the influence of resilience characteristics on cognitive and emotional reactions to exam related stress, pressure or threat. Thus, more resilient individuals would be less likely to experience negative cognitive and emotional reactions to exam situations that have typically been associated with impaired performance. Alternatively, it is possible that greater resilience might enable individuals to regulate or control negative thoughts and emotions sufficiently to lessen their impact on performance.
This study therefore, has several important aims, the first of which is to gain a deeper understanding of the experience of KS2 SATs in Year 6 primary school children, particularly in regard to the nature and sources of SAT related pressure and/or anxiety. This will be addressed largely by means of focus group discussions and teacher interviews. Secondly, using quantitative methods, the study will examine the association between SAT related anxiety and performance outcomes (SAT grades) in order to find support for the negative association consistently found in other age groups and contexts. Thus it is predicted that, after controlling for general ability, there will be evidence of a negative association between SAT related anxiety and SAT grades. Thirdly, the moderating role of resilience on the anxiety-outcome relationship will be investigated. In line with studies that have identified personal resource measures such as coping as moderators of the association, we predict that resiliency scores will moderate the association between test anxiety and SAT outcomes. More specifically, it is hypothesized that measures of resilience will interact with the cognitive and emotional components of test anxiety in influencing performance. After controlling for individual differences in ability, it is expected therefore that pupils who report lower levels of test anxiety and greater resilience would tend to have the highest SAT scores and vice-versa. Further, we would expect that more test anxious pupils who score more highly on measures of resilience will demonstrate superior exam performance compared to their less resilient counterparts.

Method
Participants

Participants were 123 year 6 pupils; 57 male and 66 female, their class teachers and headteachers from 3 primary schools in West Lancashire. The mean age at the start of the study was 10.07 years ($SD = .24$). Year 6 is the final year of primary education for English pupils in which they undertake Standardized Achievement Tests (SATS) to assess their level of attainment according to National Curriculum Key Stage 2 norms in English, maths and science.

Consent for the pupils’ participation was granted by the headteacher of each school and by passive consent of parents. Children were also given the option to participate or not, though none declined.

Design and Procedure

This was a longitudinal study involving two waves of data collection; the first wave being at the beginning of the school year/Autumn term in September and the second at the start of the Summer term towards the end of April/early May of the subsequent year approximately 1-2 weeks prior to the SATs.

The first wave of data collection involved a single visit to each school during which pupils completed Raven’s Progressive Matrices. At the second wave, data collection involved either one or two visits to each school, depending on timetabling restrictions. At this stage, pupils completed self-report questionnaire measures of test anxiety and resilience. In addition, 30 minute interviews with available class and head teachers and 30 minute focus groups were held with 6 pupils (3 male and 3 female) from each school were conducted. Pupils were selected by teachers to represent a range of abilities and attitudes towards testing. Focus groups and interviews were
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semi-structured around a series of questions/issues relevant to the research and digitally recorded for later coding. In mid July, the Heads of schools forwarded the pupils’ SAT grades for English, maths and science to the research team.

**Measures**

*Test anxiety* was measured using the *Children’s Test Anxiety Scale* (CTAS: Wren & Benson, 2004) specifically developed for primary school children in years 3 - 6 (7 – 12 year olds). The scale consists of 30 items to which children respond on a 4 point Likert scale where: 1 = almost never, 2 = some of the time, 3 = most of the time and 4 = almost always. The scale comprises 3 correlated subscales measuring worrisome thoughts (‘Thoughts’), Off-Task Behaviours’ and ‘Autonomic Reactions’.

*Resilience* was measured using the *Resiliency Scales for Children and Adolescents* (RCSA: Prince-Embury, 2005) validated for administration to 9 - 18 year olds. The scale measures three areas of perceived strength and/or vulnerability related to psychological resilience using 64 items comprising three scales, each of which are further organized into subscales, as follows:

*Sense of Mastery Scale*: optimism, self-efficacy and adaptability.

*Sense of Relatedness Scale*: Trust, support, comfort and tolerance

*Emotional Reactivity Scale*: Sensitivity, recovery and impairment.

**Qualitative Methodology**

The qualitative analysis involved the use of an ‘adapted’ grounded theory method in which initial open coded was guided to some extent by the aims of the research, whilst maintaining the recognized iterative approach to coding, beginning with open coding, moving on to axial coding and finally to selective coding (Corbin & Strauss, 2008). Teachers and pupils were questioned about their attitudes to SATs, their experiences of SATs, emotions associated with SATs, sources of SAT related pressure and the future of SATs. Transcripts of the pupil focus groups and teacher interviews were each coded by a separate pair of research team members so as to establish some consensus in the categories and themes extracted.

**Results**

**Qualitative Analysis**

A summary of relevant themes emerging from the pupil focus groups and teacher interviews are presented below. For the purpose of this paper, this summary will focus on attitudes to SATs, SAT related emotions and sources of SAT related pressure and specific quotations have been omitted.

1. **Attitudes to SATs**

The importance of KS2 SATs is framed mostly in regard to the consequences of SATs performance. Teachers, parents and pupils differ in their perceptions and attitudes in regard to their importance. According to teachers, parents assigned considerable importance to their children’s performance in the KS2 SATs, seeing it as a potential means of securing a good start to their children’s high school education if the children did well enough to be placed in a good set. However, teachers argued that this was a misconception on the part of parents as the initial setting that takes place is not fixed.
Some pupils also thought that SATs results would be used in secondary school for ability setting and that they would be beneficial in preparing for the harder level of work and greater use of tests/examinations to be encountered at secondary school, however others disagreed and there was much debate among pupils over their anticipated educational utility.

Pupils were also aware that teachers’ reputations were related to their own SATs results, although such a practice may not be a ‘fair’ reflection of a teacher’s effort if some pupils were not listening or working in class. Some pupils indicated that, if given the choice, they would not continue to do SATs whereas others would continue in order to see ‘if I had learnt anything’ and because ‘... you need to challenge yourself’. Such comments reveal a variety of positions in relation to the personal value of SATs to the pupils.

There was a strong view amongst the teachers that SATs was a ‘one moment in time’ assessment with a very narrow focus in regard to the school curriculum in general. Teachers conveyed a desire for autonomy in regard to their delivery of a curriculum, their teaching practices and approaches assessment. Teachers believed that the ongoing assessment that takes place in school was of far more benefit than the externally imposed SATs and that other aspects of the curriculum were as, if not more, important as the key skills assessed by SATs.

2. SAT related emotions

A variety of feelings were described by pupils towards SATs, some of which like ‘excited’ suggest a sense of anticipation based on a positive appraisal. Others like ‘nervous’, ‘panicky’ and ‘scared’ suggest anticipation based on a threat appraisal. Pupils discussed how the appraisal of a test was based, in part, on the perceived stakes of that test, and that a distinction could be drawn between the higher stakes SATs and the lower stakes class tests or practice SATs. One way in which pupils could reduce feeling nervous was to appraise the SATs as being like a lower stakes class reading test.

Pupils also described a distinct temporal dimension the feelings they described towards the SATs, which was also noted by teachers. The point at which these started differed widely between the students from the beginning of the school year (September), the beginning of the second term (January), a few weeks previously to a few days previously (on returning from the Easter holiday). Pupils reported that worries experienced at the beginning of a practice SAT could quickly be forgotten during the test, but this depended on subject-competence judgements and lots of variation was described between pupils. Many pupils anticipated feeling a sense of relief once the SATs were ‘over and done with’ and were looking forward to events taking place after the SATs both in school (school trips) and out of school (family holiday).

In contrast, teachers pointed out that the pupils generally had a positive attitude towards SATs. However, they emphasized the variation amongst pupils in the way they responded to the challenge of the KS2 SATs. Pupils saw SATs as a challenge and whether this was positive or negative largely depended on the children and varied between them.

For the teachers’ themselves, SAT related pressure appeared to be linked to the responsibility of ensuring a good outcome for the pupils and for the school as a whole. It was that pressure of responsibility that forced teachers to comply with the national
curriculum rather than adhering to their own preferred practices which gave rise to feelings of tension and frustration amongst teachers. More generally, there was a sense of tension, as well, between the school ethos and the NC/SATs ethos.

It was difficult for teachers to resist the pressure imposed by the NC/KS2 SATs despite wanting to follow what they often saw as superior educational practices. One teacher expressed her frustration at the National Curriculum (NC) as the pressure felt by her was to emphasise the parts of the NC likely to be tested on the SATs and didn’t have the opportunity to explore or develop topics which might be of interest to the children.

3. Sources of SAT related pressure

Pupils described the experience of being ‘under pressure’ in relation to their SATs in two ways, pressure imposed by the testing situation itself and pressure resulting from the potential of negative self-judgements. A performance-related pressure was discussed in terms of having several tests schedules together in the same week and having to complete SATs under timed conditions. Pupils revealed an understanding that performance may be adversely affected under pressured conditions.

Pupils discussed how a lower than expected grade might result in a negative self-judgement from both the pupil themselves and ‘other people’, including parents and teachers. There was considerable variation between pupils however. Some described pressure from teachers only, others from parents only, some from both parents and teachers and others from neither. Pupils felt an additional pressure when they were compared to other, sometimes high achieving, family members, such as siblings, by parents. Some pupils also described a strong competitive motive in trying to obtain a higher mark than a class mate.

These findings suggest that at least some pupils have internalised a belief that self-esteem is related to educational achievement, however when discussing the relationship between self-judgements and SATs results, some pupils explicitly disputed this link, suggesting alternative and/ or additional sources of esteem.

Pupils were portrayed by teachers as playing an independent role in their individual preparation. They appeared to possess a remarkable degree of autonomy in the preparation process along with a keen self-awareness and a high level of motivation which influenced their approach to learning and assessment. They were aware of the NC norms & targets they needed to achieve and monitored their progress in relation to them. Pupils were aware that they were ‘supposed’ to reach a NC level 4 and if they hadn’t reached this benchmark in the practice tests then they would feel they had let themselves down and would have to try harder. Children pressure also came from comparing their own achievement with their peers and classmates.

Probably the greatest amount of pressure brought to bear on pupils, was believed by teachers in both schools, to come from their parents. Parents were regarded as being greatly, if not overly, concerned with their children’s SAT performance, seeing it as having huge implications for their progression into high school. It was thought that these concerns and the emphasis on the consequences of performance in the SATs might be conveyed to the pupils by their parents and influence their emotional responses to the tests.
The teachers, however, were consistent in reporting that they, themselves, did not put undue pressures on their pupils in regard to the forthcoming SATs. Instead, they went to some lengths to downplay the importance of them and to ‘lighten up’ the situation for the pupils. Thus it became clear, that the teachers’ approach to dealing with SATs was linked closely to their attitudes towards SATs, particularly in regard to their importance.

From the interview responses it was evident that teachers had a deep concern for their pupils’ well-being as well as for their academic development. There was evidence of constant monitoring of individual pupils and a sensitivity to individual differences amongst pupils when responding to SATs related emotions.

Quantitative Analysis

From the students questionnaire scores, scale and subscale totals were calculated for the Children’s Test Anxiety Scale (CTAS) and Resiliency Scales For Children and Adolescents (RSCA) by summing across the items. Raw total scores were calculated for Raven’s Progressive matrices, SAT grades for English, Maths and Science as well as a combined SAT score.

Descriptive Statistics

Whilst the sample means for the Resiliency Scales (mastery, relatedness and reactivity) were very close to the scale means for children of this age-group, the sample means for the test anxiety subscales and scale total tended to be a little higher than the average. The test anxiety scale was validated on a smaller sample of year 6 children compared to the present study and the mean age of the year 6 children in the validation study is unknown. The higher scores of the current sample might be due to a mean age discrepancy as it has been found that test anxiety scores tend to increase with age.

The association between test anxiety and SATs grade

Pearson correlation analysis was carried out to discover whether there were any associations between measures of test anxiety and SAT scores in this sample of students

A table of correlations can be found in Table 1 from which significant, moderate and negative correlations ranging between \( r = -.30 \) to \( r = -.46 \) can be identified between pupils’ scores on all four measures of test anxiety and their SAT grades for English, maths, science and combined. The negative associations are as expected and indicate that higher levels of test anxiety are associated with poorer performance on SATs.

There are weak to moderate correlations also between the resiliency scales and test anxiety scores ranging from \( r = -.26 \), between the resiliency mastery scale scores and autonomic reactions subscale scores of test anxiety (higher levels of mastery are related to lower autonomic reactions), to \( r = .50 \) between the resiliency emotional reactivity scale scores and the overall test anxiety scores (lower emotional reactivity, indicative of greater resilience is associated with lower levels of test anxiety).

Table 1 Bivariate correlations
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The moderating influence of resilience on the association between test anxiety and SAT performance

A series of hierarchical multiple regression analyses were carried out in order to determine main and interaction effects between the measures of test anxiety and resilience (predictor variables) and SAT grades. In all analyses, Ravens scores were statistically controlled by entering them on the first step, on the second step, scores on the individual predictor variables (test anxiety and resiliency measures) were added followed by the interaction terms between the predictors on the third step.

(a) In the first of these analyses, combined SAT grades were regressed onto overall test anxiety scores and the three resiliency scale scores (mastery, relatedness and emotional reactivity). A table summarizing the result of this analysis can be found in Table 2. Ravens scores were entered on the first step and statistically controlled. The amount of variance in combined SAT scores explained by this variable (41%, \( p < .001 \)) was highly significant. Overall test anxiety together with the three resiliency scale scores explained a significant amount of additional variance (13%, \( p < .001 \)) when entered on the second step. However, the interaction terms between overall test anxiety when added on the third step did not add significantly to variance in SAT scores (\( p = .68 \)), however, the overall model was significant (\( p < .001 \)). Of the individual predictors entered on Step 2, only overall test anxiety (\( \beta = -.25, p < .01 \)) and resiliency mastery scores (\( \beta = .26, p < .01 \)) were found to be significantly associated with combined SAT grades. The former association being negative and the latter positive as would be expected. There were no significant interaction effects on SAT scores.

Table 2 Overall SATs score regressed on Ravens, overall test anxiety, emotional resiliency scales and interactions

<table>
<thead>
<tr>
<th>Variables</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
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<td></td>
<td>( R^2 )</td>
<td>( \beta )</td>
<td>( \Delta R^2 )</td>
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<td>Ravens</td>
<td>.41</td>
<td>.64</td>
<td></td>
</tr>
<tr>
<td>Overall TA</td>
<td>.53***</td>
<td>.13***</td>
<td>.50</td>
</tr>
</tbody>
</table>

*p<.05, **p<.01, ***p<.001
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| Sense of mastery       | .26   | .25   |
| Sense of relatedness   | -.03  | -.02  |
| Emotional reactivity   | .08   | .08   |
| Overall TA X Sense of mastery | .54*** | .01   | -.02   |
| Overall TA X Sense of relatedness | .06   |     |
| Overall TA X Emotional reactivity | -.06   |     |

*p < .05; **p < .01; ***p < .001.

(b) The previous analysis was repeated a further three times substituting the three individual SAT grades as the criterion variable serially in each of these. The result of the previous analysis was replicated in each of these, though with slightly smaller effects emerging (Table 3). In this analysis, the same procedure was followed as before, except that the predictor variable, overall test anxiety scores, was replaced by the scores for each of the three test anxiety subscales; thoughts, off-task behavior and autonomic reactions. Raven’s scores were, once again, entered on the first step of the analysis, followed on the second step by the three test anxiety subscales and the three resiliency scales. On the third step the interaction terms between the predictor variables were added. Combined SAT grades was the criterion variable in this analysis. A summary of the result can be found in Table 3. The test anxiety subscales and resiliency scales, when entered into the regression equation on step 2 were found to explain 13% of the variance in overall SAT scores (p = .001), and a significant amount of variance (9%, p = .03) was also accounted for when the interaction terms were entered on the third step. The overall amount of variance in combined SAT grades explained by the final model was substantial and highly significant (63%, p < .001).

Of the individual test anxiety subscales and three resiliency scales entered on the second step of the analysis, two were found to be significant predictors of combined SAT grades. A weak but significant negative association between scores on the autonomic reactions subscale of test anxiety and SATs grades (β = -.19, p < .05) indicated that pupils who reported experiencing higher levels of autonomic arousal, tended to perform more poorly in SATs overall. However, grades were found not to be significantly affected by either of the other two test anxiety subscales. The resiliency mastery scale was found, once again, to be a significant predictor of combined SAT grades (β = .27, p < .01).
Table 3 English, Maths and Science scores regressed on Ravens, overall test anxiety, emotional resiliency scales and interactions

<table>
<thead>
<tr>
<th>Variables Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R²</td>
<td>β</td>
</tr>
<tr>
<td><strong>DV: English score</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ravens</td>
<td>.26</td>
<td>.51</td>
</tr>
<tr>
<td>Overall TA</td>
<td>.38***</td>
<td>-.24***</td>
</tr>
<tr>
<td>Sense of mastery</td>
<td>.27**</td>
<td></td>
</tr>
<tr>
<td>Sense of relatedness</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>Emotional reactivity</td>
<td>.11</td>
<td></td>
</tr>
<tr>
<td>Overall TA X Sense of mastery</td>
<td>.39***</td>
<td></td>
</tr>
<tr>
<td>Overall TA X Sense of relatedness</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>Overall TA X Emotional reactivity</td>
<td>.09</td>
<td></td>
</tr>
<tr>
<td><strong>DV: Maths score</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ravens</td>
<td>.43</td>
<td>.66</td>
</tr>
<tr>
<td>Overall TA</td>
<td>.54***</td>
<td>-.23**</td>
</tr>
<tr>
<td>Sense of mastery</td>
<td>.21*</td>
<td></td>
</tr>
<tr>
<td>Sense of relatedness</td>
<td>.01</td>
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<td>Emotional reactivity</td>
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<tr>
<td>Overall TA X Sense of mastery</td>
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<tr>
<td>Overall TA X Sense of relatedness</td>
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<td>Overall TA X Emotional reactivity</td>
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</tr>
<tr>
<td><strong>DV: Science score</strong></td>
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</tr>
<tr>
<td>Ravens</td>
<td>.30</td>
<td>.54</td>
</tr>
<tr>
<td>Overall TA</td>
<td>.38***</td>
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<tr>
<td>Sense of mastery</td>
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<td>Sense of relatedness</td>
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<td>Emotional reactivity</td>
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<td>Overall TA X Sense of mastery</td>
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<tr>
<td>Overall TA X Sense of relatedness</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>Overall TA X Emotional reactivity</td>
<td>-.01</td>
<td></td>
</tr>
</tbody>
</table>

*p < .05; ** p < .01; *** p < .001. Probability values of betas were adjusted for one-tailed tests.

Several moderated effects of test anxiety on SAT grades were identified. Significant interactions indicated that the negative effect on overall SAT performance of worrisome thoughts was moderated by resiliency mastery scores. The influence of off-task behavior was moderated by resiliency relatedness, and the effect of autonomic reactions was moderated by all three measures of resiliency; mastery, relatedness and
emotional reactivity. These interactions were plotted for more detailed exploration (see Figures 1-5). The nature of the interactions in plots 1-4 was broadly similar. Lower scores on measures of test anxiety were associated with higher combined SAT grades. However, in each instance lower grades were obtained by high test anxious pupils who also scored lower scores on measures of resiliency and higher grades by those with higher resiliency scores. There is some evidence in Figure 2 that the difference in SAT scores between pupils scoring high and low on resiliency was much more pronounced when self-reported levels of test anxiety were high. More specifically, Figure 2 shows that SAT’s performance was poorer for those children who reported a greater tendency to engage in off-task behavior during exams compared to children who remained task focused. However, the discrepancy in SAT grades between these two groups was much greater for more distracted children who reported lower levels of mastery. In figure 5 the interaction takes a different form. Children who reported higher levels of test anxiety as indicated by greater autonomic reactivity tended to have lower SAT grades but the moderating influence of resilience was much less pronounced and an anomalous finding is revealed here suggesting that less resilient children, as indicated by higher scores on emotional reactivity, actually performed slightly better than children who were less emotionally labile.

(c) These results were replicated when the analysis was repeated with SAT grades for English, Maths and Science as criterion variables with the most pronounced interaction effect being between the autonomic reactivity component of test anxiety and the relatedness measure of resilience.
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Fig. 3

Fig. 4

Fig. 5
Discussion

The nature and sources of SAT related pressure / anxiety

The qualitative analysis of focus group data and teacher interviews provided a detailed insight into the experience of Key Stage 2 SATs in Year 6 primary school children in England, particularly in regard to the nature and sources of SAT related pressure and/or anxiety they might experience. SAT related anxiety was evident from start of year 6 and continued throughout the lead up to the tests. Pupils’ worries concerned their performance on specific subjects, the implications of their performance for high school transition and letting themselves and other people down. They also expressed concerns regarding the implications of their performance for teachers and the reputation of the school as a whole.

Teachers revealed emotions in the form of concern for pupils, frustrations regarding the SAT focused curriculum, anger at the use of pupil SAT performance as a means of assessing schools and anxiety about SAT outcomes.

Positive emotions were also evident – many children were reported by teachers to enjoy the challenge of testing. Such positive aspects of testing tend to be overlooked in literature. Children were very aware of National Curriculum, KS2 achievement standards and there was evidence of self-monitoring, autonomy, and comparisons with other students. This suggests that further investigation of the positive emotions experienced in stressful situation and their potential links with resilience would be useful. A more positive disposition to challenging situations would be expected for more resilient individuals. Indeed, this type of disposition is a defining characteristic of high mastery motivation (White 1959) which is tapped to some extent by the resiliency sense of mastery scale (Prince-Embury, 2005) used in this study. Furthermore, it is also worth considering that enjoyment of challenge and high test anxiety might be experienced simultaneously as these relate to separate aspects of the testing process; i.e. the challenge and the threat. Thus approach and avoidance goals might co-occur in this performance context.

Sources of pressure were found to be the pupils themselves, parents, a little from teachers and peers as well as concerns re transitions to high school (mediated by parents). Teachers were generally supportive and genuinely concerned re pupils' response to SATs; constantly monitoring pupils and providing reassuring feedback. Lightening the situation to relieve SAT related tension and organizing events for after SATs.

The qualitative findings support those of other studies, e.g. Pollard et al (2000), Reay & Willam (1999) in that several similar themes emerged.

The influence of test anxiety on SAT performance

The results of the quantitative analyses supported the prediction that higher levels of self-reported test anxiety (TA) would result in poorer SAT grades after controlling for general ability. To the knowledge of the authors, this study is the first to demonstrate the effect in the context of KS2 SATs using specific test anxiety measures. The finding supports the evidence of a negative association consistently found in other age groups and contexts. However, the effect observed in the present study is larger than: (a) that reported for older children in the UK (e.g. Putwain et al 2008; (b) effects on SAT grades using general measures of test anxiety (Zeidner, 1988); and (c) that reported in meta-analyses (e.g. Hembree 1988, cited in Zeidner & Matthews, 2005). There were significant negative partial associations between overall TA scores and overall SAT grades as well as with grades for maths, English
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and science. There were no significant partial associations between TA subscale scores and SAT grades.

As predicted, measures of resilience were found to moderate the test anxiety-performance relationship. This finding is therefore in line with other studies that have identified personal resource measures such as coping as moderators of the association (e.g. Söber, 2004). All three resiliency scales: sense of mastery, sense of relatedness and emotional reactivity were found to interact with specific components of TA, influencing SAT performance. There were no significant interactions between resiliency measures and overall TA scores. Moreover, the significant resiliency - TA interaction effects were observed for combined, as well as individual, SAT grades. The strongest and most consistent of these interactions was found to be between the resiliency sense of relatedness and the autonomic reactions component of TA. The resiliency sense of mastery scale was found to interact with all three TA components and emotional reactivity interacted with the autonomic reactions component of test anxiety. The nature of these significant interactions was generally as predicted: lower grades were obtained by high test anxious pupils who reported lower levels of resilience and vice versa. This effect was most pronounced for those pupils whose self-reported levels of test anxiety were high. SATs performance was poorer for those children who reported a greater tendency to worry, to engage in off-task behavior or to experience physical symptoms of anxiety during exams compared to children without such tendencies. However, the discrepancy in SAT grades between groups was much greater for more worried, more distracted and more physiologically aroused children who reported lower levels of resilience. An anomalous finding, however, was that less resilient children, as indicated by higher scores on emotional reactivity, who reported a greater tendency towards autonomic reactivity, actually achieved slightly higher combined SAT grades than children who were less emotionally labile. However, the discrepancy in performance was too small to be of any consequence.

Implications for transactional theories of test anxiety

This study centred on an evaluation the transactional theory of test anxiety outlined by Zeidner & Matthews (2005). Resilience was introduced as a potential moderator of the TA - exam performance association. Findings supported our predictions in this regard. However, the mechanism by which resilience exerts its effect requires more detailed consideration. It appears a reasonably straightforward task to account for how the resiliency scales of sense of mastery, sense of relatedness and emotional reactivity might influence the cognitive and emotional components of TA. A belief in one’s ability to effectively negotiate problems and difficult circumstances, and to control outcomes could conceivably influence a person’s cognitive appraisal of threatening or stressful situation. Believing that one can turn to others for help and support and that one has the unconditional positive regard of others could conceivably influence the level of threat or stress experienced in a performance context. Individuals who believe their social acceptance is conditional on their performance would be expected to appraise the testing context as more threatening and would therefore be expected to experience greater anxiety. Finally, it is also conceivable that an individual who is more prone to negative emotionality, unable to control negative emotions and who anticipates negative consequences for failure, might have high autonomic reactivity. The role of resilience could therefore be that of influencing the appraisal of threat and thereby
the level of anxiety experienced. Alternatively, higher levels of resilience related resources might enable individuals to manage any anxiety they experience thus limiting any adverse effects on performance. The Self-regulatory theory of TA which proposes that performance outcomes will influence the level of TA experienced in future test situations, could also be used as a basis for a hypothesis concerning the long-term influence of resilience. Those individuals who perform successfully despite experiencing high levels of TA may become increasingly resilient to test situations

**The meditational role of resilience**

The conceptualization of resilience implicit in this investigation into its influence on the test anxiety – performance association, represents a significant departure away from earlier and more traditional definitions of the construct (Garmezy & Rutter, 1983; Masten et al, 1990). Resilient individuals have typically been regarded as those who are able to thrive in the face of severe adversity. The SAT context, in which the construct has been examined in the present study, whilst experienced by pupils as stressful and threatening, in no way represents the conditions of adversity in which the construct was originally identified and investigated. We would not wish to claim that children who overcome their test anxiety in order to perform successfully in achievement tests are therefore resilient. However, what we have attempted to demonstrate is that dispositional characteristics, such as mastery, ability to related to others and emotional stability, that have been identified in resilient individuals, can benefit individuals in a wider range of stressful contexts. It could be argued that such characteristics predispose individuals to more successful coping and gives way to questions about the independence of various personal resource constructs that have been hypothesized to influence adaptation to stressful encounters. There appears to be a huge overlap between concepts measured in different scales such as coping, hardiness, optimism, resilience, etc. which require further detailed exploration. Can these be identified as distinct constructs or are they just variations of the same phenomenon?

This investigation into the role of resilience in the SAT context the present study was partly influenced by the knowledge that resilience interventions and/or programmes to foster resilience are being introduced into schools in England, Scotland and Wales. A recent interim report of an evaluation of the UK Resilience Programme pilot aimed at building resilience in Year 7 pupils, revealed a range of positive outcomes (Challen, Noden, West & Machin, 2009). The programme was found to have a positive impact on depression and anxiety symptoms especially in children who had performed poorly in KS2 SATs and who had higher pre-intervention symptoms of depression and anxiety. The pupils involved enjoyed the programme and believed it would benefit them in regard to problem solving, behavior and general happiness. Pupils also reported that they had used some of the ideas and skills they had learned, to good effect in everyday situations. These findings demonstrate that promoting resilience in schools has the potential for optimizing pupils’ emotional well-being, behavioural conduct and academic performance and is therefore a worthwhile focus of investigation.

**References**


