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The four Ws of test anxiety: What is it, why is it important, where does it come from, and what can be done about it?

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Abstract

Test anxiety refers to the tendency to appraise tests and test-like situations, where performance is evaluated, as threatening, and respond with high levels of state anxiety. High levels of test anxiety are associated with lower performance on test and examinations, and may also meet diagnostic criteria for clinical anxiety. In this paper we review: (i) the importance of the test anxiety construct and consider whether test anxiety may constitute a risk factor for clinical anxiety; (ii) the theoretical antecedents of test anxiety, with a specific focus on the Self-Regulatory Executive Function (S-REF) Processing Model; and (iii) interventions for test anxiety in adolescents, with a specific focus on one cognitive--behavioural intervention, Strategies to Tackle Exam Pressure and Stress (STEPS). We bring the review to a close with a consideration of what the next steps might fruitfully be for research, theory, and intervention, and conclude there is much work still yet to be done in the field of test anxiety.

Keywords: test anxiety, generalised anxiety, panic, self-regulation, cognitive-behavioural intervention, STEPS.

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Ansiedade aos Testes: O que é, porque é importante, de onde vem e o que pode ser feito acerca disso?

Resumo

Ansiedade aos testes refere-se à tendência para percecionar os testes (e situações semelhantes em que o desempenho é avaliado) como ameaçadoras, respondendo com elevados níveis de ansiedade-estado. Níveis elevados de ansiedade aos testes estão associados a um menor desempenho em testes e avaliações, podendo preencher critérios diagnósticos para ansiedade clínica. Neste artigo iremos rever: (i) a importância do conceito de ansiedade aos testes, discutindo se a ansiedade aos testes se pode constituir como um fator de risco para ansiedade clínica; (ii) os antecedentes teóricos da ansiedade aos testes, com especial incidência no Modelo de Processamento baseado na Função Executiva Auto-Reguladora (*Self-Regulatory Executive Function [S-REF] Processing Model*); e (iii) intervenções na ansiedade aos testes em adolescentes, nomeadamente, uma intervenção cognitivo-comportamental denominada Estratégias para lidar a Pressão e o Stress dos Exames (*Strategies to Tackle Exam Pressure and Stress – STEPS*). Terminamos esta revisão discutindo os próximos passos que poderão contribuir para a investigação, a teoria e a intervenção, concluindo que há muito ainda a fazer na área da ansiedade aos testes.

Palavras-chave: ansiedade aos testes, ansiedade generalizada, pânico, autorregulação, intervenção cognitivo-comportamental, STEPS.

INTRODUCTION

In this paper we provide a brief review of the test anxiety literature to address four key questions of concern to researchers, practitioners, policy makers, parents, and not least, students themselves. These questions are: (i) what is test anxiety; that is, how can it be defined and conceptualised?; (ii) why is it important; that is, what are the potential deleterious consequences of test anxiety?; (iii) where does test anxiety come from; that is, what are the theoretical antecedents of test anxiety?; and (iv), what can be done about it; that is, what interventions are available to reduce test anxiety? Test anxiety has a long history within the educational and psychological literature and there have been several notable texts (e.g., Spielberger & Vagg, 1995; Zeidner, 1998) and reviews of the literature (e.g., McDonald, 2001; Putwain, 2008; Zeidner, 2007, 2014). In the present review, our aim was to include contemporary test anxiety theory and research alongside the classic in order to provide an overview of the field.

TEST ANXIETY: WHAT IS IT?

Test anxiety refers to an enduring, trait-like tendency to appraise performance-evaluative situations as threatening and react with elevated state anxiety (Spielberger & Vagg, 1995). Performance-evaluative situations are those in which one's performance is evaluated in some way, such as the tests and examinations used in all stages of education. Test anxiety is widely considered to be multidimensional and early conceptions differentiated between distinct, but related, cognitive and affective-physiological components (Liebert & Morris, 1967; Spielberger et al., 1978). The prototypical cognitive component (originally labelled as worry) refers to self-focused negative thoughts about failure and their consequences (e.g., letting oneself down, and not fulfilling aspirations). The prototypical affective-physiological component (originally labelled as emotionality) refers to perceptions of physiological arousal (e.g., tension, elevated heart rate, stomach discomfort, and so on).

Subsequent models of test anxiety have included additional or alternative cognitive components namely test-irrelevant thoughts (Benson et al., 1992), distraction and confidence (e.g., Hodapp, 1996), and cognitive obstruction (Friedman & Bendas-Jacob, 1997). The affective-physiological component has also differentiated general feelings of test anxiety from the specific physiological symptoms of anxiety (Benson et al., 1992; Hagtvet & Benson, 1997). Furthermore, a social component (being judged negatively by others) has been proposed as a discrete component (Friedman & Bendas-Jacob, 1997; Lowe et al., 2007) along with behavioural (Wren & Benson, 2004) and motivational components (Pekrun et al., 2004).

A consequence of this proliferation of test anxiety components is a muddying of the test anxiety construct. It is not entirely clear to researchers and practitioners what components should or should not be included when measuring test anxiety or interpreting findings. There is also an added risk of jingle-jangle fallacies (see Kelley, 1927). This is where different labels (e.g., emotionality, tension, and autonomic reactions) are given to the same construct (i.e., the perception of physiological arousal; jangle) and different constructs (fear of failure, letting oneself down, and being judged negatively by peers) are given the same label (i.e., worry; jingle). Putwain et al. (2020) propose a potential solution to this conundrum by using contemporary test anxiety theories (e.g., Lowe et al., 2007; Pekrun, 2006; Segool et al., 2014; Zeidner & Matthews, 2005) to guide which components should be excluded. On this basis, test-irrelevant thoughts can be omitted as not being threat-related; social worries, confidence, and avoidance motivations can be omitted as being antecedents of test anxiety; and off-task behaviours can be omitted for being difficult to operationalise. Putwain et al.'s (2020) approach leaves two cognitive components (worry and the perception of cognitive interference) and

two affective-physiological components (tension and indicators of physiological arousal). It is not expected that all theorists will necessarily agree with their approach however what is important, moving forward, is that researchers make theoretically informed decisions when planning test anxiety research in their decisions over which components are included or excluded.

TEST ANXIETY: WHY IS IT IMPORTANT?

The principal importance of studying test anxiety is derived from a long standing body of evidence showing that test anxiety, and in particular the cognitive component, is negatively related to a wide form of educational achievement, test and examination performance (Hembree, 1988; Seipp, 1991; von der Embse et al., 2018). For instance, in the meta-analysis of 238 studies from 1988 to 2018, von der Embse et al. (2018) reported *r*s of -.26 for the relation between the cognitive component of test anxiety and performance on standardised examinations, and -.13 for the affective-physiological component. Such negative correlations cannot be interpreted causally; it is equally plausible that that low achievement could result in subsequent higher anxiety as it is that higher anxiety could result in subsequent lower achievement. It is notable, however, that longitudinal designs have shown that test anxiety can predict lower future achievement after controlling for prior achievement (Putwain et al., 2015) and cognitive ability (Putwain et al., 2013). Longitudinal studies of this type provide evidence that test anxiety is directionally related to achievement. Given the ethical and practical implausibility of artificially raising levels of test anxiety in an experimental manipulation purely for the purposes of demonstrating a causal link to lower task performance (although this does not preclude the possibility of improving task performance after intervening to reduce test anxiety), longitudinal naturalistic data remains the best evidence available at the present time.

The negative relation between test anxiety and achievement is believed to arise from cognitive interference during examinations (Wine, 1971, 1982). Although not specifically a theory of test anxiety, anxiety-performance relations are theorised most precisely and eloquently in the Attentional Control Theory (ACT: Derakshan & Eysenck, 2009, 2011; Eysenck et al., 2007). According to ACT, the cognitive component of anxiety interferes with working memory (WM) processes including inhibition (the ability to control automatic or task-irrelevant stimuli), shifting (moving back and forth between multiple task operations), and updating (recalling information from long-term memory). The result is reduced WM capacity for

current task processing, resulting in difficulty concentrating, thinking clearly, and recalling information that has been learnt. A typical experience of a highly test anxious person during an exam is to 'go blank' (Putwain, 2009). Empirical tests of ACT have shown that the lower performance of high test anxious persons are the result of WM interference in both lab (Angelidis et al., 2019; Dutke & Stöber, 2001; Putwain et al., 2014; Richards et al., 2000) and naturalistic studies (Owens et al., 2008, 2012a, 2012b).

There is, however, another good reason why test anxiety should be considered as an important construct, albeit one that has received less attention in the academic literature. Irrespective of whether test anxiety is disruptive for learning and test and examination performance, a high level of state anxiety is in and of itself an inherently unpleasant experience. Furthermore, high levels of test anxiety may be related to, or an indicator of, low subjective wellbeing and personal welfare. A corollary is that test anxiety may be risk factor for more serious forms of anxiety (e.g., clinical anxiety disorders).

Subjective wellbeing refers to the global judgement of the balance between the various positive and negative elements of one's life (Diener et al., 2018; Hascher, 2010). Experiences at school, college, and university (and any other place of formal or informal learning) could contribute to higher or lower subjective wellbeing through relationships with others, emotions (e.g., enjoyment of learning), feeling valued, experiencing physical or social problems, and so on. High test anxiety could potentially contribute to lower subjective wellbeing through the presence of unpleasant failure-focused emotions and cognitions, the perception of learning, one's place of learning, and the teaching staff, as being associated with excessive pressure, and the anticipation of threats to one's sense of self-worth. Despite the contribution of test anxiety to wellbeing not being as prominent or well recognised within the literature as the contribution to achievement, evidence for the link is long-standing.

Hembree's (1988) meta-analysis of 562 studies from 1950 to 1986 reported that test anxiety was negatively correlated with subjective wellbeing (r = -.33). More recently Hascher (2007) reported rs = -.15 to -.46, and Putwain et al. (2020) reported rs = -.03 to -.31 (in these two studies the rs varied depending on the component of test anxiety). In a longitudinal design, Steinmayr et al., (2016) showed that higher worry predicted lower subsequent mood and life satisfaction (two indicators of subjective wellbeing) after controlling for prior subsequent mood and life satisfaction, but not vice versa. The relations between test anxiety (or to be precise the cognitive, not the affective-physiological, component) and wellbeing were directional.

In dual process models (Suldo & Shaffer, 2008; Suldo et al., 2016), the presence of psychopathology is not the polar opposite of subjective wellbeing in a unidimensional fashion. Rather, subjective wellbeing and psychopathology are intersecting but distinct

dimensions and can be figured in a 2x2 matrix. Complete mental health would be indicated by the presence of high subjective wellbeing and low mental disorders and similarly, the presence of a mental disorder does not map directly to low wellbeing. If other elements of a person's life (e.g., relationships, environment, and so on) are good, subjective wellbeing can be relatively high even in the presence of a mental disorder (a group labeled by Suldo and Shaffer (2008) as 'symptomatic but content'). Even though higher test anxiety is related to lower wellbeing, this might not implicate test anxiety as being a risk factor in the development of clinical anxiety disorders. It is possible for high wellbeing to co-exist with test and/or clinical anxiety.

The relations between test anxiety and emotional psychopathology (symptoms of anxiety and depression) have not been extensively researched. Warren et al. (1996) compared students in Grades 4, 7, and 11, scoring in the $\leq 33^{rd}$ and $\geq 66^{th}$ percentiles of Test Anxiety Inventory (TAI) scores. Students in the upper tertile of TAI scores reported higher clinical anxiety and depression. Herzer et al. (2014) used a receiver-operator curve analysis to show that test anxiety scores in the $\geq 66^{th}$ percentile of the German TAI could reliably predict clinical anxiety (social anxiety or specific phobia), assessed through a clinical interview, with 96.6% accuracy. Furthermore, a study of adolescent suicide over a 16-month period found that examination pressures were cited as a specific cause in 15% of Coroners' reports and academic pressures more widely in 27% (Rodway et al., 2016).

It is widely accepted that high levels of (general) trait anxiety is a risk factor for generalised clinical anxiety (Rapee, 2001) and emotional disorders more generally (Kennedy et al., 2001). The aforementioned findings (Herzer et al., 2014; Rodway et al., 2016; Warren et al., 1996) would indicate that high levels of trait test anxiety would also be a risk factor. Indeed, LeBeau et al. (2010) argue that high levels of test anxiety could be accommodated under existing DSM-5 criteria for social or specific phobia, or generalised anxiety (also see Gerwing et al., 2015). According to the integrated network approach (Heeren & McNally, 2016, 2018) anxiety is represented as associated nodes of directly and indirectly connected symptoms. Central nodes are those that are more densely and closely connected to others and the activation of central nodes acts as a 'hidden generator' to spread anxiety activation throughout the network and render the person vulnerable to an anxiety disorder. Hence, anxieties about one situation can quickly and easily generalise to others. If test anxiety features represent central nodes in a network of associated anxiety symptoms then the activation of test anxiety nodes could spread to other anxiety symptoms and increase the risk of developing an anxiety disorder. It is notable that two core transdiagnostic processes across anxiety disorders, namely the presence of intrusive worrisome thoughts and a difficulty in disengaging from threat triggers (Clark & Rhyno, 2005), are present in test anxiety.

TEST ANXIETY: WHERE DOES IT COME FROM?

There are four contemporary theories of test anxiety to account for how and why test anxiety develops. These are Spielberger and Vagg's (1995) transactional process model, Zeidner and Matthew's (2005) Self-Regulatory Executive Function (R-REF) Processing Model, Lowe et al.'s (2007) biopsychosocial model, and Segool et al.'s (2014) cognitive behavioural model. Although it is not specifically a theory of test anxiety, Pekrun's (2006) control-value theory can also be considered here, as test anxiety falls under one of the achievement emotions considered. Spielberger and Vagg's (1995) transactional process model is a micro-level theory that provides a moment-by-moment account of how levels of state anxiety may fluctuate during a test situation based on the perceived item difficulty, one's test taking skills, and perceived ability to answer the question. The remaining theories are less granular and provide an account of why a specific testing situation, or testing situations in general, result in elevated test anxiety.

The theory we elaborate on is Zeidner and Matthew's (2005) S-REF model. We chose this model as in our view it articulates the processes involved in the development of anxiety in a greater level of specificity than the other theories, although it does share common elements with other theories, and is not without criticism. The greater level of specificity in processes allows for a greater input into the development of intervention. The S-REF model was originally developed as a model of emotion disorders (Wells & Matthews, 1994, 1996) that was adapted to test anxiety (Matthews et al., 1999), and subsequently a range of evaluation anxieties, including test anxiety, public speaking anxiety, and so on (Zeidner & Mathews, 2005). The S-REF model is organised around three inter-related dynamic systems: self-regulatory executive processing, self-knowledge beliefs, and maladaptive person-situation interactions.

Self-regulatory processes are triggered by either external or internal events. An external event could be receiving a date and time for a forthcoming examination, or being reminded about the importance of preparing well for a forthcoming examination by a teacher. An internal event could be cognitive (e.g., recalling a forthcoming examination), but also include bodily sensations of arousal as a signal one is potentially anxious. Self-regulatory processes include an appraisal of the trigger event in relation to one's goals (e.g., is this examination important to me?; what will happen if I fail?), how one plans to cope with the trigger event (e.g., distract oneself, or spend time studying), and metacognitive beliefs. Test anxious persons appraise examinations as being personally important, use maladaptive approaches to cope (for a review see Skinner & Saxton, 2019) and

hold metacognitive beliefs that maintain or amplify the anxiety (e.g., worrying helps me to stay focused).

Regulatory processes are driven by, and draw on, self-beliefs including one's perceived competence in studying, test-taking skills, and the material that is being tested, based on prior experience as well as exaggerated beliefs about failure (e.g., catastrophizing, personalisation, and perfectionism). Test anxious persons have poor competence beliefs and/or exaggerated beliefs about failure. Maladaptive person-situation interactions include a biased attention to threat, avoidance of opportunities to improve one's competence or skills through effort withdrawal, procrastination, and other academic self-handicapping strategies, driven largely by avoidance. Such strategies might protect one's sense of self-worth against failure, but ultimately and paradoxically increase the likelihood of failure (see Covington, 2009). Maladaptive person-situation interactions feedback to self-beliefs (e.g., reinforcing the belief that one has low competence) and increase the likelihood of future self-regulatory triggers being appraised in the same way, thus locking the person into a debilitating cycle of anxiety.

There is evidence for many of the links proposed in the S-REF model including the role of poor competence beliefs (e.g., Pekrun et al., 2004; Putwain & Aveyard, 2018; Putwain, Woods, et al., 2010), maladaptive coping processes (Putwain et al 2012, 2016; Stöber, 2004), avoidance coping (e.g., Eum & Rice, 2011; Putwain & Symes, 2012), metacognition (Matthews et al., 1999; O'Carroll & Fisher, 2013), perfectionism and cognitive distortions (Putwain, Connors, et al., 2010; Stöber et al., 2009), and maladaptive person-situation interactions (Cassady, 2004; Gadbois & Sturgeon, 2011; Putwain, 2019; Putwain et al., 2011).

There are, however, two main drawbacks to the S-REF model we would like to highlight. First, emotion regulation, attempts to suppress or enhance the experience or expression of emotions (see Gross & Thompson, 2007), is a central self-regulatory process yet has received scant attention in the S-REF model. Emotion regulation would be expected to play a key role in determining how people respond prior to and during examinations, and is an important antecedent of test anxiety (Harley et al., 2019). Second, the S-REF model is highly individualised and unlike some of the other theories (e.g., Lowe et al., 2007; Segool et al., 2014) does not account for wider ecological and social factors (e.g., school ethos, class climate, testing regimes, etc.) that impact on test anxiety. There is scope for further theoretical development of the S-REF model to incorporate these important elements.

Despite these drawbacks, the S-REF models offers multiple possible points for intervention based on each of the three systems. Self-regulatory processes can be targeted to ensure that persons can distinguish between adaptive and maladaptive

forms of coping, and be taught how to plan for and use adaptive forms of coping. People can be taught to monitor maladaptive metacognitive beliefs (e.g., that worry is helpful) and biased and exaggerated thinking (e.g., catastrophic beliefs about failure), how to challenge such beliefs, and identity and adopt more realistic beliefs. If self-beliefs about low competencies are rooted in reality, interventions can include study and test-taking skills training and practice. In a psychological intervention there may not be the skills or time to address low competence beliefs in the material to be examined (and this is best left for those tasked with regular instruction) however people can be helped to plan effective ways of building their subject-specific competencies (e.g., using principles of self-regulated learning). This approach will also be useful for breaking cycles of maladaptive person-situation interactions rooted in avoidance (e.g., procrastination and effort withdrawal); cycles of behaviour that maintain anxiety that are rooted in avoidance can also be challenged during intervention. Finally, relaxation strategies, including progressive muscle relaxation and diaphragmatic breathing, can be included as methods for controlling acute anxiety responses, which can act as triggers for further cycles of executive self-regulation.

TEST ANXIETY: WHAT CAN BE DONE ABOUT IT?

A variety of different types of psychological interventions have been shown to be effective in reducing test anxiety. The meta-analysis by Hembree (1988) included 137 treatment studies of behavioural, cognitive, study-skills, and test-taking skills, interventions, and combinations of these approaches. All approaches successfully reduced test anxiety; the largest statistically significant effect was for behavioural intervention when combined with study skills training (mean reduction in test anxiety = -1.22) and the smallest statistically significant effect was for cognitive-behavioural intervention in pre-college students (mean reduction in test anxiety = -0.53). Ergene's meta-analysis (2003) of 56 studies from 1974 to 1998 also included the aforementioned interventions (behavioural, cognitive, and skill-focussed, either alone or in combination). All were successful in reducing test anxiety with an average effect size of 0.65; the largest effect was for cognitive intervention when combined with skills focus (average standardised effect size = 1.22) and the smallest effect was for cognitive-behavioural intervention (average standardised effect size = 0.36).

Far fewer studies have examined the effect of test anxiety interventions on achievement or test scores. Given that high levels of test anxiety are associated

with lower achievement and test performance, a reduction in test anxiety might be expected to coincide with greater achievement and test performance. Vagg and Spielberger (1995) reviewed six intervention studies based on behavioural interventions alone or in combination with study-skills training. Although all techniques were effective in reducing test anxiety, only the combined behavioural intervention with study-skills training improved test performance. In the only study we are aware of to examine whether a test anxiety intervention could improve achievement in secondary school students, Keogh et al. (2006) showed that students participating in a 10-week cognitive-behavioural intervention performed better on high-stakes secondary school leaving examinations, than their cognitive ability matched, randomly assigned, control group counterparts.

Ergene (2003) noted that few of the interventions were specifically designed for populations of school children. A review of interventions targeted specifically at school aged populations a decade later (2000 to 2010) revealed little had changed; only 10 studies published during this period included school-aged participants (von der Embse et al., 2013). This is somewhat surprising and also concerning. Adolescence is a critical period both educationally, where in many countries students take high-stakes examinations, and developmentally, where stress-sensitive limbic and cortical areas of the brain are vulnerable (Romeo, 2013). It is notable that anxiety developing during childhood tends to re-occur throughout one's life (Garber & Weersing, 2010). We now describe an intervention for test anxiety used in English secondary schools along with three evaluation studies.

In England, along with Wales and Northern Ireland, secondary education covers Years 7 to 11 (ages 11-16 years). At the end of Year 11 students take high-stakes standardised examinations, known as GCSEs (General Certificate of Secondary Education). Entry into upper secondary academic education, college-based vocational or technical education, or work-based training and apprenticeships, depends on a minimum pass grades in English and mathematics, along with a profile of pass grades in other subjects depending on the focus on ones' post-16 study (Onion, 2004; Roberts, 2004). Furthermore, employment in all occupations, other than routine or manual, requires minimum pass grades in English and mathematics and some competitive professions require high grades in the majority of examinations taken (Maguire, 2010; Unwin, 2010). Furthermore, school GCSE results are published in a competitive fashion that ranks schools in a particular locality into 'league tables' (to use a sporting analogy). The school inspectorate regime was until recently[3] also

3 A new inspection framework was introduced in September (2019) that placed a greater emphasis on student wellbeing (Office for Standards in Education, Children's Services and Skills, 2019).

heavily focused, for secondary schools, on GCSE performance with the power to recommend replacing the management of schools, or even closing schools, where students were judged to be underperforming (Department for Education, 2016; Perryman, 2006; Perryman et al., 2011; Roberts & Abreu, 2016). As a result of their importance, the GCSE context is a highly appropriate one in which to provide and evaluate test anxiety intervention.

Strategies to Tackle Exam Pressure and Stress (STEPS) is a six-session programme designed to address the dearth of test anxiety interventions for secondary students more generally, and specifically to address the lack of interventions available for use in English secondary schools (Putwain et al., 2014). To our knowledge, there has only been one published intervention using samples of English secondary school students prior to STEPS (Keogh et al., 2006). STEPS was designed as a multimodal intervention to include management strategies that target distinct cognitive, behavioural, and emotional aspects of test anxiety. In comparison to less eclectic interventions, multimodal approaches can increase the number of management strategies offered to an individual (Flaxman et al., 2003) increasing the likelihood of a person finding strategies they are able to make use of.

STEPS was based on Well's (1997) approach to cognitive-behavioural interventions (drawn from the S-REF model) and existing cognitive-behavioural test anxiety interventions (Flaxman et al., 2003; Gregor, 2005) combined with study and test-taking skills training. Each of the six sessions has a different focus. The aim of session one is to allow participants to recognise the signs and effects of, and the triggers for, test anxiety. The aim of session two is to recognise and challenge negative and debilitating thought patterns, and practice more positive ways of thinking about exams. The aim of session three is to learn and practice relation techniques including diaphragmatic breathing and progressive muscle relaxation. The aim of session four is to learn and practice a range of study and test-taking skills. The aim of session five is to learn how different forms of motivation influence study approaches and test-anxiety. The aim of session six is to review the different approaches in earlier sessions and consider what aspects worked most effectively. More details for the content of each session are provided in Putwain et al. (2014).

The content of each session was programmed into the presentational software Articulate to allow for a standardised presentation. The content of each session included the following elements: Psychoeducational instruction, quiz-based reinforcement of learning, self-reflection exercises (these were recorded in an accompanying booklet), practice of anxiety management techniques, and short video clips of adolescent students talking about their own experiences of test anxiety and use of anxiety management strategies. Each session takes approximately 40 minutes to complete.

Three formal evaluations of STEPS have been undertaken. In the first study, 3225 students in Years 10 and 11 of English secondary education, studying for their GCSE examinations, were randomly allocated to intervention or wait-list control groups (Putwain et al., 2014) and test anxiety measured pre- and post-intervention. STEPS was completed by participants as a self-help tool and the completion rate was poor: only 217 participants (13.7%) of the 1600 allocated to the intervention group completed all six sessions. With such a poor completion rate, an intention to treat analysis would not be meaningful. Instead, participants who had completed all six sessions were compared to control group participants and a randomly sampled group of participants initially allocated to receive the intervention, but who did not complete all six sessions. Thus, analyses were unable to make use of the random allocated procedure and the design becomes more akin to a quasi-experimental allocation. For those in the pre-intervention lower 66th percentile of scores (i.e., those who were initially low or mid in test anxiety) STEPS did not have any effect on post-intervention anxiety. However, participants in the upper 66th percentile of pre-intervention test anxiety scores (i.e., those who were initially highly test anxious) showed lower test anxiety scores compared to control group participants (worry d = 0.63; tension d = 0.53) and intervention group participants who did not complete all six sessions (worry d = 0.89; tension d = 0.49).

A second study addressed the limitations of Putwain et al. (2014) in two ways. First, the intervention was delivered to a targeted group of highly test anxious persons and, second, the intervention was delivered to small groups of six to eight students by a trained facilitator (Putwain & Prescod, 2018). The study was conducted at two English secondary schools where 428 students in Years 10 and 11, studying for GCSE examinations, were screened using a standardised test anxiety measure. Fifty-six participants scored in the upper 66th percentile of scores and were randomly allocated to an early or late intervention groups. Follow-up measures were taken after the early intervention group had completed the six sessions and after the late intervention group had completed their sessions.

Participants in the early intervention group showed declines in worry (d = 0.76) and tension (d = 1.14) compared to those in the late intervention (control) group whose worry scores remained unchanged and tension scores showed a negligible decline (d = 0.08). Participants in the late intervention group showed similar declines in worry (d = 0.79) and tension (d = 1.14) after completing the STEPS sessions. Importantly, despite small increases, the worry (d = -.020) and tension (d = -0.09) scores of participants in the early group remained low. Uncertain control was also included in this study as a potential mediator and showed declines for

the early intervention group (d = 0.60) compared to those in the late intervention (control) group whose uncertain control remained unchanged. Uncertain control also declined in the late group following intervention (d = 0.47) and importantly the uncertain control scores of the early intervention group remained low. A meditational analysis showed the reduction in worry and tension scores were partly attributable to the reduction in uncertain control.

A third study also used a facilitator to deliver STEPS in small groups of targeted students (Putwain & von der Embse, 2021). The study was conducted at eight English secondary schools where 1073 students in Years 10 and 11, studying for GCSE examinations, were screened using a standardised test anxiety measure. One hundred and sixty-one participants scored in the upper 66th percentile of scores and were randomly allocated to an intervention or wait-list condition where the STEPS intervention was delivered in groups of six to eight students. In addition to test anxiety, this study also included two forms of clinical anxiety (generalised anxiety and panic) and school-related wellbeing as outcomes. Following intervention, test anxiety reduced at a greater rate (d = 0.86) than for control group participants (d = 0.62), and both generalised anxiety (d = 0.43) and panic (d = 0.54) were reduced following intervention in comparison to the scores of control group participants that did not change from pre- to post-intervention. A meditational analysis confirmed that the reduction in generalised anxiety and panic following intervention was attributable to the concurrent reduction in test anxiety. These findings provide indirect evidence for the integrated network approach to anxiety (Heeren & McNally, 2016, 2018) and the possibility that test anxiety may be a risk factor for clinical anxiety. The intervention did not, however, impact on school-related wellbeing, most likely a result of test anxiety being just one of several contributors of subjective wellbeing.

In addition to the schools and participants included in these formal evaluation studies, STEPS has also been delivered to partnership schools of the institution at which the first author is affiliated. Students aged 14-16 years, and studying for GCSE examinations, are targeted through a combination of screening using a standardised test anxiety questionnaire (to identify those scoring in the upper tertile of scale scores), self-referred students, and those identified through school staff with a responsibility for pastoral care of students. Students were invited to provide anonymous feedback after the sixth session on their experiences of STEPS and whether it was beneficial or not. The results reported in Table 1 below are based on informal feedback from students collected in the period 2016 to 2019 from 102 students. Students responded to six questions on a five-point scale (1 = 'strongly disagree', 3 = 'neutral', 5 = 'strongly agree').

Table 1
Anonymous feedback provided by Year 10 and 11 students after completing STEPS sessions

	Mean	***SD***
After completing STEPS I am in a better position to control my worry when revising for a test or exam	3.86	0.68
After completing STEPS I am in a better position to control my worry before going into a test or exam	4.10	0.89
After completing STEPS I am in a better position to control my worry during a test or exam	3.81	0.77
I can cope with the pressure of doing GCSE better after completing STEPS	3.65	0.75
STEPS has taught me useful techniques to deal with exam stress	4.02	0.69
I would use the techniques learnt in STEPS in an exam situation	4.22	0.77

These perceptions of the students who engaged in STEPS provide additional evidence for its effectiveness. In addition to these questions, the informal feedback provided the opportunity for students to write open text comments about the elements of STEPS that did and did not work in their view. In keeping with the nature of a multi-modal intervention, the same element (e.g., relaxation techniques) would be described as more effective by some students and less effective by others. No specific element of STEPS was described by the majority of students as being more or less effective. One element of STEPS that did seem to polarise opinions, were the use of video clips of students who had recently completed their GGCEs talking about their experiences. Students either seemed to strongly like or dislike these video clips. Those who strongly liked the video clips were reassured that they were not the only persons experiencing exam anxiety; those who did not like them described the clips as being 'forced' or 'not realistic'. This may reflect an individual difference in highly test anxious students (e.g., need for reassurance) that determines how specific persons respond to the different elements of the intervention. In future, it would be desirable to research these individual differences to tailor interventions more closely to the needs of specific individuals.

DIRECTIONS FOR FUTURE RESEARCH

From a theoretical perspective, there has been much research that examines specific elements of theories, for instance the relations between competence beliefs

and test anxiety as hypothesised in the S-REF (Zeidner & Matthews, 2005), cognitive-behavioural (Segool et al., 2014), control-value (Pekrun, 2006), and biopsychosocial models, but too few studies that examine multiple processes specified by these, and other, theories. Due to the complexity of these theories, it is unlikely that all of the processes could be examined within a single study. Carefully designed and executed studies could, however, incorporate multiple processes to provide more thorough tests of the processes and links specific in these, and other, models. Relatedly, there has been a move away in the past decade or so, in educational psychology research from relying on cross-sectional designs to using longitudinal designs with two or more waves or data, or intrapersonal designs to capture more real-time data. The field of test anxiety would substantially benefit from more studies of this type to provide more robust evidence for the processes specified in the aforementioned theories.

From a theoretical perspective, a substantial extension of control-value theory has been the consideration of emotion regulation (Harley et al., 2019). Given the regulation of emotions is likely to be key to understanding the development, maintenance, and possible treatment of test anxiety, this would not only be a fruitful area of future research, but also for integration more broadly within test anxiety theory. A parallel line of research to that of test anxiety has begun to study the 'choking under pressure' hypothesis (Wang & Shah, 2013). It is important to establish whether this phenomenon is simply test anxiety under a new label, or whether this new direction of research has important insights for test anxiety (e.g., a more detailed consideration of how working memory capacity interacts with perceived pressure) theory that was widely been considered thus far.

With regards to interventions, it is reassuring to see effective interventions developed for, and tested on, samples of children and adolescents reported in the literature. Recent examples in addition to the studies on STEPS reviewed above include mindfulness (Carsley & Heath, 2018), expressive writing (Rozek et al., 2019), attention training (Fergus & Limbers, 2019), diaphragmatic breathing (Khng, 2017), relaxation training combined with exposure (Weems et al., 2015), and cognitive-behavioural therapy (Yeo et al., 2016). However, there remains an overall dearth of evidence-based interventions for test anxiety in children and adolescents, and more studies are needed to either assess the factors that determine the effectiveness of existing interventions, or to develop and evaluate new interventions. An understanding on the mechanisms that mediate effective intervention (Powers et al., 2017) and the implementation characteristics that moderate effective intervention (Myers et al., 2012) are essential in being able to shape the effectiveness of future interventions. However, studies of this type are almost absent completely from the test anxiety literature. Hence, at present there is limited evidence on why interventions may be successful and the factors that can help implement effective test anxiety interventions. There is a desperate and urgent need for research in these areas.

CONCLUSIONS

We could conclude that while the degree of anxiety experienced by a student in a specific test or exam may at times be elevated and at other times reduced, the principal concern of researchers and practitioners are those people who tend to experience a high degree of anxiety in the majority of tests and exams that they take (people who are high in *trait* test anxiety). Test anxiety is an important phenomenon to take seriously for two reasons: it can obstruct achievement in test, or exam, performance, and can also be an indicator of (and possibly a risk factor of) clinical anxiety. Insights from various theoretical models suggest that high test anxiety develops from a complex interaction between the way that people appraise the importance and value of an examination, how they judge their capacity to prepare for and perform in that examination, and the approach that is actually taken to preparing for that exam. Fortunately, test anxiety is responsive to intervention and evidence currently available suggests that a number of intervention approaches could be utilised with samples of children or young people. Much scholarly work has already been undertaken on test anxiety. There is, however, much more work yet to be done.

REFERENCES

Angelidis, A., Solis, E., Lautenbach, F., van der Does, W., & Putman, P. (2019). I'm going to fail! Acute cognitive performance anxiety increases threat-interference and impairs WM performance. *PloSOne, 14*(2), e0210824. https://doi.org/10.1371/journal.pone.0210824

Benson, J., Moulin-Julian, M., Schwarzer, C., Seipp, B., & El-Zahhar, N. (1992). Cross validation of a revised test anxiety scale using multi-national samples. In K. A. Hagvet & T. B. Johnsen (Eds.), *Advances in Test Anxiety Research Vol. 7* (pp. 62-83). Swets & Zeitlinger.

Carsley, D., & Heath, N. L. (2018). Effectiveness of mindfulness-based colouring for test anxiety in adolescents. *School Psychology International, 39*(3). 251-272. https://doi.org/doi/10.1177/0143034318773523

Cassady, J. C. (2004). The influence of cognitive test anxiety across the learning-testing cycle. *Learning and instruction*, *14*(6), 569-592. https://doi.org/10.1016/j.learninstruc.2004.09.002

Clark, D. A., & Rhyno, S. (2005). Unwanted intrusive thoughts in nonclinical individuals: Implications for clinical disorders. In D. A. Clark (Ed.), *Intrusive thoughts in clinical disorders: Theory, research, and treatment* (pp.1-29). Guilford Press.

Covington, M. (2009). Self-worth theory. In K. R. Wentzel & D. B. Miele (Eds.), *Handbook of motivation at school* (pp. 141-169). Routledge.

Department for Education (2016). *Primary school accountability in 2016: A technical guide for primary maintained schools, academies and free schools*. HMSO.

Derakshan, N., & Eysenck, M. W. (2009). Anxiety, processing efficiency and cognitive performance: New developments from attentional control theory. *European Psychologist, 14*(2), 168-176. https://doi.org/10.1027/1016-9040.14.2.168

Derakshan, N., & Eysenck, M. W. (2011). New perspectives in attentional control theory. *Personality and Individual Differences, 50*(7), 955-960. https://doi.org/10.1016/j.paid.2010.08.019

Diener, E., Oishi, S., & Tay, L. (2018). Advances in subjective well-being research. *Nature Human Behaviour, 2*, 253-260. https://doi.org/10.1038/s41562-018-0307-6

Dutke, S., & Stöber, J. (2001). Test anxiety, working memory and cognitive performance: Supportive effects of sequential demands. *Cognition and Emotion, 15*(3), 381-389. https://doi.org/10.1080/02699930125922

Ergene, T. (2003). Effective interventions for test anxiety reduction. *School Psychology International, 24*(3), 313-328. https://doi.org/10.1177/01430343030243004

Eum, K., & Rice, K. G. (2011). Test anxiety, perfectionism, goal orientation, and academic performance. *Anxiety, Stress, & Coping*, *24*(2), 167-178. https://doi.org/10.1080/10615806.2010.488723

Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). Anxiety and cognitive performance: attentional control theory. *Emotion, 7*(2), 336-353. https://doi.org/10.1037/1528-3542.7.2.336

Fergus, T. A., & Limbers, C. A. (2019). Reducing test anxiety in school settings: A controlled pilot study examining a group format delivery of the attention training technique among adolescent students. *Behavior Therapy, 50*(4), 803-816. https://doi.org/10.1016/j.beth.2018.12.001

Flaxman, P. E., Bond, F. W., & Keogh, E. (2003). Preventing and treating evaluation strain: A technically eclectic approach. In F. W. Bond & W. Dryden (Eds.), *Handbook of brief cognitive-behavior therapy* (pp. 239-288). John Wiley & Sons.

Friedman, I. A., & Bendas-Jacob, O. (1997). Measuring perceived test anxiety in adolescents: A self-report scale. *Educational and Psychological Measurement, 57*(6), 1035-1046. https://doi.org/10.1177/0013164497057006012

Gadbois, S. A., & Sturgeon, R. D. (2011). Academic self-handicapping: relationships with learning specific and general self-perceptions and academic performance over time. *British Journal of Educational Psychology, 81*(2), 207-222. https://doi.org/10.1348/000709910X522186

Garber, J., & Weersing, V. R. (2010). Comorbidity of anxiety and depression in youth: Implications for treatment and prevention. *Clinical Psychology, 17*(4), 293-306. https://doi.org/10.1111/j.1468-2850.2010.01221.x

Gerwing, T. G., Rash, J. A., Gerwing, A. M. A., Bramble, B., & Landine, J. (2015). Perceptions and incidence of test anxiety. *The Canadian Journal for Scholarship of Teaching and Learning, 6*, Article 3. https://doi.org/10.5206/cjsotl-rcacea.2015.3.3

Gregor, A. (2005). Examination anxiety: Live with it, control it or make it work for you? *School Psychology International, 26*(5), 617-635. https://doi.org/10.1177/0143034305060802

Gross, J. J., & Thompson, R. A. (2007). Emotion regulation: Conceptual foundations. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 3-24). Guilford Press.

Hagtvet, K. A., & Benson, J. (1997). The motive to avoid failure and test anxiety responses: Empirical support for integration of two research traditions. *Anxiety, Stress & Coping, 10*(1), 35-37. https://doi.org/10.1080/10615809708249294

Harley, J. M., Pekrun, R., Taxler, J. L., & Gross, J. J. (2019). Emotion regulation in achievement situations: An integrated model. *Educational Psychologist, 54*(2), 106-126. https://doi.org/10.1080/00461520.2019.1587297

Hascher, T. (2007). Exploring student's wellbeing by taking a variety of looks into the classroom. *Hellenic Journal of Psychology, 4*, 331-349. https://pseve.org/publications/journal/hellenic-journal-of-psychology-volume-04/

Hascher, T. (2010). Wellbeing. In P. Peterson, E. Baker & B. McGaw (Eds.), *International Encyclopedia of Education Volume 6* (pp. 732-738). Elsevier.

Heeren, A., & McNally, R. J. (2016). An integrative network approach to social anxiety disorder: The complex dynamic interplay among attentional bias for threat, attentional control, and symptoms. *Journal of Anxiety Disorders, 42*, 95-104. https://doi.org/10.1016/j.janxdis.2016.06.009

Heeren, A., & McNally, R. J. (2018). Social anxiety disorder as a densely interconnected network of fear and avoidance for social situations. *Cognitive Therapy and Research, 42*(1), 101-113. https://doi.org/10.1007/s10608-017-9876-3

Hembree, R. (1988). Correlates, causes, effects and treatment of test anxiety. *Review of Educational Research*, *58*(1), 47-77. https://doi.org/10.3102/00346543058001047

Herzer, F., Wendt, J., & Hamm, A. O. (2014). Discriminating clinical from nonclinical manifestations of test anxiety: A validation study. *Behavior Therapy, 45*(2), 222-231. https://doi.org/10.1016/j.beth.2013.11.001

Hodapp, V. (1996). The TAI-G: A multidimensional approach to the assessment of test anxiety. In C. Schwarzer & M. Zeidner (Eds.), *Stress, anxiety and coping in academic settings* (pp. 95-130). Tübingen: Basil.

Kelley, T. L. (1927). *Interpretation of educational measurements*. World Book Co.

Kennedy, B. L., Schwab, J. J., Morris, R. L., & Beldia, G. (2001). Assessment of state and trait anxiety in subjects with anxiety and depressive disorders. *Psychiatry Quarterly, 72*(3), 263-276. https://doi.org/10.1023/A:1010305200087

Keogh, E., Bond, F. W., & Flaxman, P. E. (2006). Improving academic performance and mental health through a stress management intervention: Outcomes and mediators of change. *Behaviour Research and Therapy, 44*(3), 339-357. https://doi.org/10.1016/j.brat.2005.03.002

Khng, K. H. (2017). A better state-of-mind: deep breathing reduces state anxiety and enhances test performance through regulating test cognitions in children. *Cognition and Emotion, 31*(7), 1502-1510. https://doi.org/10.1080/02699931.2016.1233095

LeBeau, R. T., Glenn, D., Liao, B., Wittchen, H., Beesdo-Baum, K., Ollendick, T., & Craske, M. G. (2010). Specific phobia: a preliminary review of DSM-IV specific phobia and preliminary recommendations for DSM-V. *Depression and Anxiety, 27*(2), 148-167. https://doi.org/10.1002/da.20655

Liebert, R. M., & Morris, L. W. (1967). Cognitive and emotional components of test anxiety: A distinction and some initial data. *Psychological Reports, 20*(3), 975-978. https://doi.org/10.2466/pr0.1967.20.3.975

Lowe, P. A., Lee, S. W., Witteborg, K. M., Prichard, K. W., Luhr, M. E., Cullinan, C. M., Mildren, B. A., Raad, J. M., Cornelius, R. A., & Janik, M. (2007). The Test Anxiety Inventory for Children and Adolescents (TAICA). *Journal of Psychoeducational Assessment, 26*(3), 215-230. https://doi.org/10.1177/0734282907303760

Maguire, S. (2010). 'I just want a job' – what do we really know about young people in jobs without training? *Journal of Youth Studies*, *13*(3), 317-333. https://doi.org/10.1080/13676260903447551

Matthews, G., Hillyard, E. J., & Campbell, S. E. (1999). Metacognition and maladaptive coping as components of test anxiety. *Clinical Psychology and Psychotherapy*, *6*(2), 111-125. https://doi.org/10.1002/(SICI)1099-0879(199905)6:2%3C111::AID-CPP192%3E3.0.CO;2-4

McDonald, A. S. (2001). The prevalence and effects of test anxiety in school children, *Educational Psychology, 21*(1), 89-101. https://doi.org/10.1080/01443410020019867

Myers, D. C., Durlak, J. A., & Wandersman, A. (2012). The Quality Implementation Framework: Asynthesis of critical steps in the implementation process. *American Journal of Community Psychology, 50*(3-4), 462-480. https://doi.org/10.1007/s10464-012-9522-x

O'Carroll, P. J., & Fisher, P. (2013). Metacognitions, worry and attentional control in predicting OSCE performance. *Medical Education, 47*(6), 562-568. https://doi.org/10.1111/medu.12125

Office for Standards in Education, Children's Services and Skills. (2019). *School inspection handbook*. HMSO.

Onion, A. J. (2004). What use is mathematics to me? A report on the outcomes from student focus groups. *Teaching Mathematics and its Applications, 23*(4), 189-194. https://doi.org/10.1093/teamat/23.4.189

Owens, M., Stevenson, J., Hadwin, J. A., & Norgate, R. (2012a). Anxiety and depression in academic performance: An exploration of the mediating factors of worry and working memory. *School Psychology International, 33*(4), 433-449. https://doi.org/10.1177/0143034311427433

Owens, M., Stevenson, J., Hadwin, J. A., & Norgate, R. (2012b). When does anxiety help or hinder cognitive test performance? The role of working memory capacity. *British Journal of Psychology, 105*(1), 92-101. https://doi.org/10.1111/bjop.12009

Owens, M., Stevenson, J., Norgate, R., & Hadwin, J. A. (2008). Processing efficiency theory in children: Working memory as a mediator between trait anxiety and academic performance. *Anxiety, Stress, & Coping*, *21*(4), 417-430. https://doi.org/10.1080/10615800701847823

Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review, 18*(4), 315-341. https://doi.org/10.1007/s10648-006-9029-9

Pekrun, R., Goetz, T., Perry, R. P., Kramer, K., & Hochstadt, M. (2004). Beyond test anxiety: Development and validation of the Test Emotions Questionnaire (TEQ). *Anxiety, Stress & Coping, 17*(3), 287-316. https://doi.org/10.1080/10615800412331303847

Perryman, J. (2006). Panoptic performativity and school inspection regimes: Disciplinary mechanisms and life under special measures. *Journal of Education Policy, 21*(2), 147-161. https://doi.org/10.1080/02680930500500138

Perryman, J., Ball, S., Maguire, M., & Braun, A. (2011). Life in the pressure cooker – School league tables and English and mathematics teachers' responses to accountability in a results-driven era. *British Journal of Educational Studies*, *59*(2), 179-195. https://doi.org/10.1080/00071005.2011.578568

Powers, M. B., deKleine, R. A., & Smits, J. A. J. (2017). Core mechanisms of cognitive behavioral therapy for anxiety and depression: A review. *Psychiatric Clinics of North America, 40*(4), 611-623. https://doi.org/10.1016/j.psc.2017.08.010

Putwain, D. W. (2008). Deconstructing test anxiety. *Emotional and Behavioural Difficulties, 13*(2),141-155. https://doi.org/10.1080/13632750802027713

Putwain, D. W. (2009). Assessment and examination stress in Key Stage 4. *British Educational Research Journal, 35*(3), 391-411. https://doi.org/10.1080/01411920802044404

Putwain, D. W. (2019). An examination of the self-referent executive processing model of test anxiety: Control, emotional regulation, self-handicapping, and examination performance. *European Journal of Psychology of Education, 34*(2), 341-358. https://doi.org/10.1007/s10212-018-0383-z

Putwain, D. W., & Aveyard, B. (2018). Is perceived control a critical factor in understanding the negative relationship between cognitive test anxiety and examination performance? *School Psychology Quarterly*, *33*(1), 65-74. https://doi.org/10.1037/spq0000183

Putwain, D. W., Chamberlain, S., Daly, A., & Sadreddini, S. (2014). Reducing test anxiety among school-aged adolescents: A field experiment. *Educational Psychology in Practice, 30*(4), 220–240. https://doi.org/10.1080/02667363.2014.964392

Putwain, D. W., Chamberlain, S., Daly, T., & Saddredini, S. (2015). Academically buoyant students are less anxious about and perform better in high-stakes examinations. *British Journal of Educational Psychology, 85*(3), 247-263. https://doi.org/10.1111/bjep.12068

Putwain, D. W., Connors, E., & Symes, W. (2010). Do cognitive distortions mediate the test anxiety-examination performance relationship? *Educational Psychology*, *30*(1), 11-26. https://doi.org/10.1080/01443410903328866

Putwain, D. W., Daly, A. L., Chamberlain, S., & Sadreddini, S. (2016). 'Sink or swim': Buoyancy and coping in the cognitive test anxiety-academic performance relationship. *Educational Psychology*, *36*(10), 1807-1825. https://doi.org/10.1080/01443410.2015.1066493

Putwain, D. W., Langdale, H. C., Woods, K. A., Nicholson, L. J. (2011). Developing and piloting a dot-probe measure of attentional bias for test anxiety. *Learning and Individual Differences, 21*(4), 478-482. https://doi.org/10.1016/j.lindif.2011.02.002

Putwain, D. W., Nicholson, L. J., Connors, E., & Woods, K. A. (2013). More resilient children are less test anxious and perform better in tests at the end of primary schooling. *Learning and Individual Differences, 28*, 41-46. https://doi.org/10.1016/j.lindif.2013.09.010

Putwain, D. W., & Prescod, M. (2018). Is reducing uncertain control the key to successful test anxiety for Secondary school students? Findings from a randomized control trial. *School Psychology Quarterly, 33*(2), 283-292. https://doi.org/10.1037/spq0000228

Putwain, D. W., Shah, J., & Lewis, R. (2014). Performance-evaluation threat does not always adversely affect verbal working memory in high test anxious persons. *Journal of Cognitive Education and Psychology, 13*(1), 120-136. https://doi.org/10.1891/1945-8959.13.1.120

Putwain, D. W., & Symes, W. (2012). Are low competence beliefs always associated with high test anxiety? The mediating role of achievement goals. *British Journal of Educational Psychology, 82*(2), 207-224. https://doi.org/10.1111/j.2044-8279.2011.02021.x

Putwain, D. W., Symes, W., Connors, E., & Douglas-Osborn, E. (2012). Is academic buoyancy anything more than adaptive coping? *Anxiety, Stress & Coping, 25*(3), 349-358. https://doi.org/10.1080/10615806.2011.582459

Putwain, D. W., & von der Embse, N. P. (2021). Cognitive-behavioural intervention for test anxiety in adolescent students: Do benefits extend to school-related wellbeing and clinical anxiety. *Anxiety, Stress, and Coping, 34*(1), 22-36. https://doi.org/10.1080/10615806.2020.1800656

Putwain, D. W., von der Embse, N. P., Rainbird, E. C., & West, G. (2020). The development and validation of a new Multidimensional Test Anxiety Scale (MTAS). *European Journal of Psychological Assessment*. Advance online publication. https://doi.org/10.1027/1015-5759/a000604

Putwain, D. W., Woods, K. A., & Symes, W. (2010). Personal and situational predictors of test anxiety of students in post-compulsory education. *British Journal of Educational Psychology, 80*(1), 137-160. https://doi.org/10.1348/000709909X466082

Rapee, R. M. (2001). The development of generalized anxiety. In M. W. Vasey & M. R. Dadds (Eds.), *The developmental psychopathology of anxiety* (pp. 481-503). Oxford University Press.

Richards, A., French, C. C., Keogh, E., & Carter, C. (2000). Test anxiety, inferential reasoning and working memory load. *Anxiety, Stress & Coping, 13*(1), 87-109. https://doi.org/10.1080/10615800008248335

Roberts, K. (2004). School-to-work transitions: Why the United Kingdom's educational ladders always fail to connect. *International Studies in Sociology of Education, 14*(3), 203-216. https://doi.org/10.1080/09620210400200126

Roberts, N., & Abreu, L. (2016). *School inspections in England: Ofsted (Briefing Paper 07091)*. London: House of Commons Library. http://researchbriefings.files.parliament.uk/documents/SN07091/SN07091.pdf

Rodway, C., Tham, S. G., Ibrahim, S., Turnbull, P., Windfuhr, K., Shaw, J., ... & Appleby, L. (2016). Suicide in children and young people in England: A consecutive case series. *The Lancet Psychiatry, 3*(8), 699-700. https://doi.org/10.1016/S2215-0366(16)30094-3

Romeo, R. D. (2013). The teenage brain: The stress response and the adolescent brain. *Current Directions in Psychological Science, 22*(2), 140-145. https://doi.org/10.1177/0963721413475445

Rozek, C.S., Ramirez, G., Fine, R. D., & Beilock, S. L. (2019). Reducing socioeconomic disparities in the STEM pipeline through student emotion regulation. *Proceedings of the National Academy of Sciences of the United States of America, 116*(5), 1553-1558. https://doi.org/10.1073/pnas.1808589116

Segool, N. K., von der Embse, N. P., Mata, A. D., & Gallant, J. (2014). Cognitive behavioural model of test anxiety in a high-stakes context: An exploratory study. *School Mental Health, 6*(1), 50-61. https://doi.org/10.1007/s12310-013-9111-7

Seipp, B. (1991). Anxiety and academic performance: A meta-analysis of findings. *Anxiety Research, 4*(1), 27–41. http://dx.doi.org/10.1080/08917779108248762

Skinner, E. A., & Saxton, E. A. (2019). The development of academic coping in children and youth: A comprehensive review and critique. *Developmental Review, 53*, 1-55. https://doi.org/10.1016/j.dr.2019.100870

Spielberger, C. D., Gonzalez, H. P., Taylor, D. J., Algaze, B., & Anton, W. D. (1978). Examination stress and test anxiety. In C. D. Spielberger & I. G. Sarason (Eds.), *Stress and anxiety* (Vol. 5). Hemisphere; Wiley.

Spielberger, C. D., & Vagg, R. P. (1995). Test anxiety: A transactional process model. In C. D. Speilberger & P. R. Vagg (Eds.), *Test anxiety: Theory, assessment and treatment*, (pp. 3-14). Taylor & Francis.

Steinmayr, R., Crede, J., McElvany, N., & Wirthwein, L. (2016). Subjective well-being, test anxiety, academic achievement: Testing for reciprocal effects. *Frontiers in Psychology, 6*, 1994. https://doi.org/10.3389/fpsyg.2015.01994

Stöber, J. (2004). Dimensions of test anxiety: Relations to ways of coping with pre-exam anxiety and uncertainty. *Anxiety, Stress & Coping, 17*(3), 213-226. https://doi.org/10.1080/10615800412331292615

Stöber, J., Feast, A. R., & Hayward, J. A. (2009). Self-oriented and socially prescribed perfectionism: Differential relationships with intrinsic and extrinsic motivation and test anxiety. *Personality and Individual Differences, 47*(5), 423-428. https://doi.org/10.1016/j.paid.2009.04.014

Suldo, S. M., & Shaffer, E. J. (2008). Looking beyond psychopathology: The dual-factor model of mental health in youth. *School Psychology Review*, *37*(1), 52-68. https://doi.org/10.1080/02796015.2008.12087908

Suldo, S. M., Thalji-Raitano, A., Kiefer, S. M., & Ferron, J. M. (2016). Conceptualizing high school students' mental health through a dual-factor model. *School Psychology Review*, *45*(4), 434-457. https://doi.org/10.17105/SPR45-4.434-457

Unwin, L. (2010). Learning and working from the MSC to New Labour: Young people, skills and employment. *National Institute Economic Review*, *212*, R49-R60. https://doi.org/10.1177/0027950110372443

Vagg, P. R., & Spielberger, C. D. (1995). Treatment of test anxiety: Application of the transactional process model. In C. D. Spielberger & P. R. Vagg (Eds.), *Test anxiety: Theory, assessment, and treatment* (pp. 195-215). Taylor & Francis.

von der Embse, N., Barterian, J., & Segool, N. (2013). Test anxiety interventions for children and adolescents: A systematic review of treatment studies from 2000-2010. *Psychology in the Schools, 50*(1), 57-71. https://doi.org/10.1002/pits.21660

von der Embse, N. P., Jester, D., Roy, D., & Post, J. (2018). Test anxiety effects, predictors, and correlates: A 30-year meta-analytic review. *Journal of Affective Disorders, 227*, 483-493. https://doi.org/10.1016/j.jad.2017.11.048

Wang, Z., & Shah, P. (2013). The effect of pressure of high- and low-working-memory students: An elaboration of the choking under pressure hypothesis. *British Journal of Educational Psychology, 84*(2), 226-238. https://doi.org/10.1111/bjep.12027

Warren, M. K., Ollendick, T. H., & King, N. J. (1996). Test anxiety in girls and boys: A clinical-developmental analysis. *Behaviour Change, 13*(3), 157-170. https://doi.org/10.1017/S0813483900004939

Weems, C. F., Scott, B. G., Graham, R. A., Banks, D. M., Russell, J. D., Taylor, L. K., Cannon, M. F., Varela, R. E., Scheeringa, M. A., Perry, A. M., & Marino, R. C. (2015). Fitting anxious emotion-focused intervention into the ecology of schools: Results from a test anxiety program evaluation. *Prevention Science, 16*(2), 200-210. https://doi.org/10.1007/s11121-014-0491-1

Wells, A. (1997). *Cognitive therapy of anxiety disorders: A practice manual and conceptual guide*. John Wiley & Sons.

Wells, A., & Matthews, G. (1994). *Attention and emotion: A clinical perspective*. Lawrence Erlbaum Associates

Wells, A., & Matthews, G. (1996). Modelling cognition in emotional disorder: The S-REF model. *Behaviour Research and Therapy*, *34*(11-12), 881-888. https://doi.org/10.1016/S0005-7967(96)00050-2

Wine, J. D. (1971). Test anxiety and the direction of attention. *Psychological Bulletin, 76*(2), 92-104. https://doi.org/10.1037/h0031332

Wine, J. D. (1982). Evaluation anxiety: A cognitive-attentional construct. In H. W. Krohne & L. Laux (Eds.), *Achievement, stress and anxiety* (pp. 207-219). Hemisphere.

Wren, D., & Benson, J. (2004). Measuring test anxiety in children: Scale development and internal construct validation. *Anxiety Stress & Coping, 17*(3), 227-240. https://doi.org/10.1080/10615800412331292606

Yeo, L. S., Goh, V. G., & Liem, G. A. D. (2016). School-based intervention for test anxiety. *Child & Youth Care Forum, 45*(1), 1-17. https://doi.org/10.1007/s10566-015-9314-1

Zeidner, M. (1998). *Test anxiety: The state of the art*. Plenum.

Zeidner, M. (2007). Test anxiety in educational contexts: Concepts, findings and future directions. In P. A. Schutz & R. Pekrun (Eds.), *Emotion in education* (pp. 165-184). Elsevier.

Zeidner, M. (2014). Anxiety in education. In R. Pekrun & L. Linnenbrink-Garcia (Eds.), *International handbook of emotions in education* (pp. 265-288). Routledge.

Zeidner, M., & Matthews, G. (2005). Evaluation anxiety. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 141-163). Guilford Press.