Cognitive-Behavioural Intervention for Test Anxiety in Adolescent Students: Do Benefits Extend to School-Related Wellbeing and Clinical Anxiety

David W. Putwain[1], Nathaniel P. von der Embse[2]

[1]School of Education, Liverpool John Moores University, Liverpool, UK.

[2]College of Education, University of South Florida, Florida, USA.

Author Note

David W. Putwain https://orcid.org/0000-0001-5196-4270

Nathaniel P. von der Embse https://orcid.org/0000-0003-2545-7691

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Correspondence

Correspondence concerning this article should be addressed to: David W. Putwain, School of Education, Liverpool John Moores University, IM Marsh Campus, Mossley Hill Rd, Liverpool, L17 6BD. Phone: +44 (0)151 231 5270. Email: D.W.Putwain@ljmu.ac.uk

Abstract

Cognitive-behavioural interventions have been shown to be effective treatments for test anxiety. Studies on school-aged populations, however, are lacking. In the present study we evaluated a six-session cognitive-behavioural intervention for test anxiety in a sample of secondary school students aged 14-16 years preparing for high-stakes examinations. Furthermore, we extended outcomes to include school-related wellbeing and clinical anxiety. A screening procedure was used to identify highly test anxious persons who were randomly allocated to intervention or wait-list control groups. Test anxiety showed a large reduction following intervention compared to control group participants who showed a moderate reduction. Clinical anxiety showed a small to moderate reduction following intervention compared to control group participants who showed a negligible reduction. The reduction in clinical anxiety was mediated by concurrent reductions in test anxiety. This supports an integrative network approach that deactivating core aspects of anxiety can deactivate associated networks of anxiety symptoms. The intervention showed no impact on school-related wellbeing which increased at a similar rate for both intervention and control group participants. This is likely because test anxiety is just one contributor of many to school-related wellbeing. Implications for school-based treatments are discussed.

Keywords: **test anxiety, cognitive-behavioural intervention, wellbeing, generalised anxiety, panic**

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Test anxiety is a situation-specific form of trait anxiety, reflecting enhanced emotionality (affective-physiological reactions) to evaluative situations accompanied by worrisome cognitions (referred to as worry for expediency) anticipating failure and its consequences (Spielberger & Vagg, 1995). The importance of test anxiety within the psychoeducational literature has been largely derived from its disruptive impact on achievement and test performance (von der Embse et al., 2018). There is long-standing evidence, however, that test anxiety is negatively associated with markers of wellbeing (Hembree, 1988) and high levels of test anxiety can overlap with clinical anxiety (Herzer et al., 2014). Wellbeing and the absence of clinical anxiety (and other forms of psychopathology) are two related, yet distinct, indicators of psychological health (Suldo & Shaffer, 2008). Cognitive-behavioural interventions (CBIs) are one class of treatments that have been shown to be effective in reducing test anxiety among secondary school students. There are no studies of CBI for test anxiety, however, that have included student wellbeing or clinical anxiety as additional outcomes (von der Embse et al., 2013). In the present study, we address this gap in the literature by conducting an experimental evaluation of a cognitive-behavioural intervention for test anxiety in a sample of secondary school students and extend outcomes to consider school-related wellbeing and symptoms of clinical anxiety as well as test anxiety.

The Development of Test Anxiety in Evaluative Situations

The Self-referent Executive Processing (S-REF) model (Zeidner & Matthews, 2005) details the processes that contribute to enhanced emotional reactions and worry cognitions during evaluative situations. Central to the model are executive processes: an appraisal of the evaluative situation and plans for coping with the situation. Test anxious persons appraise the

evaluative situation as having personal importance, but where failure is a likely outcome, and employ counterproductive coping strategies that focus on minimising the emotional impact (e.g., avoidance) rather than strategies that could reduce the likelihood of failure (e.g., seeking help). Negative metacognitive beliefs (e.g., worry is a helpful coping strategy) maintain and enhance appraisal of the evaluative situation as a threat. Executive processes draw on self-beliefs; test anxious persons hold negative beliefs about their academic abilities and their study- and test-taking skills. Furthermore, test anxious persons avoid opportunities to improve their academic abilities and their study- and test-taking skills (e.g., academic procrastination and self-handicapping) to further reinforce their negative beliefs.

The result of these combined processes is elevated state anxiety, cognitive interference, and distress. Heightened state anxiety and cognitive interference are acknowledged in other contemporary theories of test anxiety (e.g., Lowe et al., 2008; Segool, von der Embse et al., 2014; Spielberger & Vagg, 1995). The S-REF model is unique among theories of test anxiety for specifying distress as an adjoining experience. There is wide empirical support for the processes proposed in the S-REF model including metacognition and coping (Matthews et al., 1999; O'Carroll & Fisher, 2013), coping and self-beliefs (Putwain & Aveyard, 2018; Putwain et al., 2016), academic self-handicapping behaviours and procrastination (Gadbois & Sturgeon, 2011; Putwain, 2018) and the appraisal of likely failure on test with valued outcomes (Brandmo et al., 2019; Lauermann et al., 2017).

Cognitive-Behavioural Intervention for Test Anxiety

CBIs for test anxiety teach students how to challenge worrisome thoughts and break cycles of avoidance behaviour often in conjunction with relaxation strategies (e.g., guided visualisation or deep breathing) and study-skills training (Flaxman et al., 2003). Meta-analyses have shown CBIs to result in moderate reductions in test anxiety. For example, Hembree (1988) reported 53 CBI studies with standardised mean differences ranging from -

.55 to -.87; the standardised mean differences of five studies combining CBI with study-skills training was -.83. Ergene (2003) reported eight CBI studies with an effect size of $E_+ = .36$ and two studies combining CBI with study-skills training with a standardised effect size of $E_+ = .72$. The majority of the studies (both CBI and other interventions) reported in Hembree's (1988) and Ergene's (2003) meta-analyses were based on samples of undergraduate students and the evidence base for CBI (and other) interventions using samples of secondary school students aged 11-19 years is limited. A review of interventions published 2000 to 2010 (von der Embse et al., 2013) identified only 10 test anxiety interventions focused on children and adolescents (including three CBIs), only three of which used a randomised control trial (RCT) design.

Since von der Embse et al.'s (2013) review three studies have contributed to evidence base for test anxiety CBIs in children and young people. Putwain et al. (2014) evaluated a six-session self-help CBI with participants aged 14-16 years using a quasi-experimental design. Highly test anxious participants showed moderate to large reductions in post-intervention test anxiety compared to non-intervention controls (*d*s = .49 - .89). A subsequent evaluation of the same six-session CBI, delivered by a facilitator to highly test anxious students, using a RCT design showed moderate to large reductions (*d*s = .76 – 1.44) in post-intervention test anxiety compared to non-intervention controls (Putwain & Prescod, 2018). Finally, Yeo et al. (2016) evaluated a four-session, facilitated CBI on participants aged 9-12 years using a quasi-experimental design. Highly test anxious participants showed a moderate reductions in test anxiety two month post-intervention compared to non-intervention controls (*d* = .52). These studies (Putwain et al., 2013; Putwain & Prescod, 2018; Yeo et al., 2016) along with those included in the von der Embse et al.'s (2013) review provide evidence that a relatively brief CBI can be an effective approach to reducing test anxiety in children and young people.

Test Anxiety and Wellbeing

Hembree's (1988) seminal meta-analysis reported that test anxiety was negatively correlated with subjective wellbeing (r = -.33). Subjective wellbeing is defined as the holistic judgement between the balance of positive and negative elements of one's life in general, or specific aspects of one's life, such as schooling (Diener et al., 2018; Hascher, 2010). In the present study we focus specifically on school-related wellbeing as there are concerns that high-stakes school leaving examinations (General Certificate of Secondary Education: GCSE) exert a pervasive influence on the latter stages of secondary education in England (Putwain, 2009). School-related wellbeing refers to the balance between three positive (positive attitudes towards school, enjoyment of school, and positive academic self-concept) and three negative (worry about school, physical complaints in school, and social problems at school) elements of school life (Hascher, 2003).

The negative emotions and cognitions that comprise test anxiety (e.g., anticipating failure, feelings of panic) would be expected to reduce positive, and increase negative, elements of school life therefore contributing to lower school-related wellbeing. The involvement of test anxiety in lower school-related wellbeing may be amplified when a particular stage of education becomes highly-focused towards preparation for, and attainment in, high-stakes examinations (e.g., those used to access further education and/ or training). The only study to have specifically examined how test anxiety and *school-related* wellbeing were related (Hascher, 2007) supported the expected negative relations (rs = -.15 to -.46). By reducing the negative emotions and cognitions that contribute to low school-related wellbeing, a successful CBI to reduce test anxiety would also be expected to indirectly increase school-related wellbeing.

Test Anxiety and Clinical Anxiety

As noted above, test anxiety is conceptualised as a trait; a characteristic along which persons vary to explain individual differences in emotionality and worry. Nonetheless persons reporting high levels of trait test anxiety, as with general trait anxiety (Chambers et al., 2004), can show levels of anxiety and dysfunction commensurate with clinical anxiety, such as specific phobia, social phobia, and generalized anxiety (LeBeau et al., 2010). There is a substantial overlap between clinical and test anxiety as demonstrated by Herzer et al. (2014), who showed scores in the upper 66th percentile of the German Test Anxiety Inventory reliably clinical anxiety (assessed through a clinical interview), and Warren et al. (1996), who showed scores in the upper 66th percentile of the Test Anxiety Inventory were associated with elevated clinical anxiety and depression scores.

The integrative network approach to anxiety disorders proposes that associated symptom nodes are spread across an interconnected network (Hereen & McNally, 2016, 2018). The more strongly that two symptom nodes are connected increases the likelihood that activation of one node will activate the other. For instance, in social anxiety disorder, fear of meeting strangers could generalize to other social situations such as avoidance of taking a test (Hereen & McNally, 2018). Central nodes are those with strongly developed connections to many others; activation of these nodes spreads throughout and contributes to the development and/ or maintenance of a disorder (Borsboom & Cramer, 2013). In the present study we chose to focus on two classes of clinical anxiety symptoms, namely generalised anxiety and panic. Generalised anxiety is characterised by excessive worries about a number of events and panic as the intense experience of fear or discomfort, such as palpations and accelerated heart rate (American Psychiatric Association, 2013). Generalised anxiety was chosen due the shared focus, with test anxiety, on worry, and panic as this is an experience reported by highly test anxious students before and during examinations (Putwain, 2009).

The central cognitive feature of test anxiety (or in the parlance of the network approach, the central network node), the worrisome thoughts anticipating a negative outcome is one of the core features across different forms of anxiety (Clark & Rhyno, 2005; Wells, 2009). Activation of this node could link directly and indirectly to others via paths in networks of anxiety symptoms to act as a hidden 'generator' that renders persons vulnerable to the development of anxiety disorders (Heeren et al., 2018). Deactivation of this central anxiety node through intervention will reduce the activation of anxiety networks and the associated risk of developing clinical anxiety. From this perspective, test anxiety is a risk factor for the development of clinical anxiety. Accordingly, we would anticipate that successful CBI to reduce test anxiety will indirectly reduce symptoms of clinical anxiety through deactivation of central nodes relating to worry. As we noted above, no CBIs for test anxiety have included clinical anxiety outcomes.

Aim of the Present Study

The aim of the present study was to evaluate a CBI for test anxiety with a sample of secondary school students using a RCT design. The Strategies to Tackle Exam Pressure and Stress (STEPS: Putwain et al., 2014) was delivered as a targeted intervention to small groups of five to seven highly test anxious students by a trained facilitator. Findings will contribute to the growing evidence base for CBI for test anxiety in children and young people and make a unique contribution to the extant literature by including school-related wellbeing and clinical anxiety as outcomes.

Our hypotheses were as follows:

H1: Highly test anxious participants will show a reduction in test anxiety following CBI compared to non-intervention controls.

H2: Highly test anxious participants will show an improvement in school-related wellbeing, and reduction in clinical anxiety, following CBI compared to non-intervention controls.

H3: Improvement in school-related wellbeing, and reduction in clinical anxiety, following CBI will be indirect and mediated by reductions in test anxiety.

Method

Participants

There were 146 participants in this study (female = 101, male = 39, not reported = 6) drawn from eight English secondary schools (M = 18.3 participants per school). The mean age of participants was 14.1 Years (SD = .66); 76 were in Year 11 (the final year of secondary education) and 70 were from Year 10 (the penultimate year of secondary education). Participants were mainly of white Caucasian ethnic heritage (n = 105) with smaller numbers from Asian (n = 26), Black (n = 13), and other (n = 2) backgrounds. A small number of participants (n = 6) were eligible for free school meals (a proxy for low income), a lower proportion that the English average for the year that the study was conducted (Department for Education, 2018). Data were collected using an online survey tool that was programmed to prompt participants to complete missing responses. Other than 15 participants who withdrew from the study (hence no post-intervention data) there were no missing data.

Design

The study used a 2x2 mixed factorial design with one between-participants factor (intervention vs. control) and one within-participants factor (pre- vs. post-intervention). Participants were randomly assigned to either the CBI or wait-list control condition. Pre-intervention measurements were taken from the screening procedure (described below) and post-intervention measurements taken one week after the final CBI session. For ethical purposes, participants allocated to the control group were offered the opportunity to receive

the CBI after the post-intervention measurements were collected. Unfortunately we were not able to collect additional outcome data after the control group had completed the CBI.

Measures

Test Anxiety

Test anxiety was measured using the *Revised Test Anxiety Scale* (RTA: Hagtvet & Benson, 1997). Items were adapted to refer to 'exams' rather than 'tests' in order to match the parlance of English secondary education. This instrument contains items that correspond to four scales: Worry (e.g., 'Thinking about my grade in a subject interferes with my work on exams'), test-irrelevant thoughts (e.g., 'While taking exams I sometimes think about being somewhere else'), tension (e.g., 'During exams I feel very tense'), and bodily symptoms of anxiety (e.g., 'I get a headache during an important exam'). Participants responded to items on a four-point scale (1 = 'Almost never', 2 = 'Sometimes', 3 = 'Often', and 4 = 'Always'), thus a higher score indicates higher test anxiety. Previous studies have supported the psychometric properties of the RTA when modelled as four-correlated factors or with a single higher-order factor (e.g., Benson & El-Zahar, 1994). In the present study we used a single test score, as our substantive questions were not concerned with the different domains of test anxiety. McDonald's ω in the present study was .87 for pre-intervention scores and .91 for post-intervention scores.

School-Related Wellbeing

School-related wellbeing was measured using the School-Related Wellbeing scale (SWBS: Loderer, Vogl, & Pekrun, 2016). This 6-item scale provides a unidimensional holistic assessment of subjective wellbeing in the school context. Particpants responded to items (e.g., 'School is going well for me') on a five point scale (1 = 'Strongly disagree', 2 = 'Disagree', 3 = 'Neither', 4 = 'Agree', and 5 = 'Strongly agree'). A higher score represents greater wellbeing. The undimensional factor structure, strong internal consistency, and

predictive validity for achievement, has been shown in previous studies (e.g., Putwain et al., 2020). McDonald's ω in the present study was .89 for pre-intervention scores and .90 for post-intervention scores.

Clinical Anxiety

Clinical anxiety was measured using the 6-item generalised anxiety and 9-item panic subscales from the Revised Children's Anxiety and Depression Scale (RCADS: Chorpita et al., 2005). Participants responded to items (e.g., 'I worry about things' for generalised anxiety and 'All of a sudden I feel really scared for no reason at all' for panic) on a 4-point scale (0 = 'Never', 1 = 'Sometimes', 2 = 'Often', and 3 = 'Always'). A higher score, therefore, represents greater generalised anxiety and/ or panic. This widely used scale has demonstrated excellent psychometric properties in previous studies including internal consistency, test-retest reliability, and convergent validity, and predictive validity for clinical diagnoses (e.g., Ebesutani et al., 2011). McDonald's ω in the present study was .76/.82 for pre-intervention generalised anxiety and panic scores respectively, and .89/ .90 for post-intervention scores generalised anxiety and panic scores respectively.

Procedure

Whole year cohorts at participating schools were screened to identify potential candidates for CBI using the RTA. Students with scores in the 66th percentile (most likely to benefit from intervention; Putwain et al., 2014) and those identified by school staff were invited to a meeting where the aims and content of the CBI, and the level of participant commitment were discussed, and to provide an opportunity for potential participants to ask questions. The project was approved by an institutional research ethics committee (18/EDN/001). Following written consent from individual participants and parents/carers, participants at each school were allocated to CBI or control conditions. Participants allocated an odd number were assigned to the CBI condition and those allocated an even number were

assigned to the control condition. This procedure was undertaken by the member of school staff acting as the liaison for this project and allocation concealed from the project team until after the post-intervention measurements were collected. The CBI was delivered by trained assistant psychologists to groups five to seven participants on school premises during the regular school timetable. One CBI session per week was delivered for six consecutive weeks (unless there was a scheduled mid-term break for one week). The participant flowchart is presented in Figure 1.

The Intervention

STEPS is a six-session manualised CBI for test anxiety specifically designed for adolescent participants. Highly test anxious students experience differing combinations of cognitive, emotional, and behavioural, elements (Zeinder & Matthews, 2005). Multi-modal interventions, that cover a range of management techniques, are more appropriate for test anxiety than more focused interventions (Flaxman et al., 2003). Accordingly STEPS was designed as a multi-modal approach. Each of the six session focused on a different component: session 1 to understand and recognize the signs and effects of test anxiety, session 2 to recognise and challenge negative and biased ways of thinking about failure, session 3 was to learn and practice ways of controlling physiological manifestations of test anxiety, session 4 to learn and practice study- and test-taking skills, session 5 to understand different forms of motivation and challenge avoidance behaviours, and session 6, to evaluate the usefulness of the different strategies. A more detailed description of each session can be found in Putwain et al. (2014).

STEPS content was programmed into the professional presentation software Articulate to enable standardised delivery by the facilitator whereby each session follows the same order at a similar pace. Each session took approximately 45 minutes to complete. Each session contained a combination of different activities including: psychoeducational

instruction (e.g., how to identify a biased or unrealistic thought about failure), quiz-based reinforcement of learning, self-reflection exercises, practice of anxiety management techniques, and short-video clips of students who have recently completed their GCSE examinations taking about their experiences of test anxiety and its management. Each session was followed with homework exercises to practice the anxiety management techniques learnt in that session.

Results

Descriptive statistics are presented in Table 1. Cohen's d effect sizes were adjusted for within-participants comparisons (Morris & DeShon, 2002) and interpreted as follows: *d* >.2 was considered as small, *d* >.5 was considered as medium, and *d* >.8 was considered as large (Cohen, 1992) and). Data were analysed in two stages. Initially four 2x2 mixed ANOVAs, with condition (intervention vs. wait-list) as a between-participants factor and time (pre- vs. post-intervention) as a within-participants factor, were conducted, one ANOVA each for test anxiety, school-related wellbeing, generalised anxiety, and panic. These were followed by meditational analyses to establish whether any statistically significant effects of CBI on school-related wellbeing, generalised anxiety, and panic, were indirect and mediated through changes in test anxiety.

With one exception, data were normally distributed (skewness and kurtosis for test anxiety, school-related wellbeing and clinical anxiety were within ±1). Although post-intervention panic scores showed slight leptokursis (-1.15), small degrees of kurtosis do not bias parameter estimates (Schmider eta al., 2010). Levine's and Mauchly's tests for homogeneity of variance were non-significant (*p*s >.05) indicating that ANOVA assumptions were met. Omega squared (ω_p^2) effect sizes were calculated for main effects and interactions in ANOVAs and interpreted as follows: ω^2 >.01 was considered as small, ω^2 >.06 was

considered as medium, and $\omega^2 > .14$ was considered as large (Kirk, 1996). To control for familywise errors a Bonferroni correction was applied ($\alpha = .017$).

[Table 1 here]

Test Anxiety

There were main effects for time, $F(1,129) = 69.09$, $p < .001$, $\omega^2 = .30$, and intervention, $F(1,129) = 9.87$, $p = .002$, $\omega^2 = .07$, that were clarified by a time x intervention interaction, $F(1,129) = 14.58$, $p < .001$, $\omega^2 = .07$ (see Figure 2). Participants receiving the CBI showed a larger statistically significant decrease in test anxiety from pre- to post-intervention, $t(64) = 6.75$, $p < .001$, $d = .86$, than control group participants: $t(65) = 4.99$, $p < .001$, $d = .62$.

School-related Wellbeing

There was a main effect for time, $F(1,129) = 11.54$, $p = .001$, $\omega^2 = .08$, but not intervention, $F(1,129) = 0.48$, $p = .49$, $\omega^2 = .03$, or the time x intervention interaction, $F(1,129) = 4.29$, $p = .04$, $\omega^2 = .04$ (see Figure 3). Participants in both CBI, $t(64) = -2.80$, $p = .007$, $d = .36$, and control, $t(65) = -2.64$, $p = .01$, $d = .33$, conditions showed small statistically significant increases in school-related wellbeing from pre- to post-intervention, with comparable effect sizes[1].

Clinical Anxiety

Generalised Anxiety

There was a main effects of time, $F(1,129) = 14.55$, $p < .001$, $\omega^2 = .10$, but not intervention, $F(1,129) = 4.27$, $p = .04$, $\omega^2 = .03$, that was clarified by a time x intervention interaction, $F(1,129) = 9.25$, $p = .003$, $\omega^2 = .06$ (see Figure 4). Participants receiving the CBI showed a small statistically significant decrease in generalised anxiety from pre- to post-intervention, $t(64) = 3.74$, $p < .001$, $d = .43$, whereas control group participants showed no statistically significant change: $t(65) = 0.94$, $p = .35$, $d = .11$.

[1] Although there is a greater increase in raw school-related wellbeing means in the CBI condition, when *d*s are adjusted for the correlations between pre- and post-intervention scores (Morris & DeShon, 2002) the *d* for the CBI condition is only marginally greater than *d* for the control condition.

Panic

There were main effects for time, $F(1,129) = 21.76$, $p < .001$, $\omega^2 = .13$, and intervention, $F(1,129) = 7.78$, $p = .006$, $\omega^2 = .06$, that were clarified by a time x intervention interaction, $F(1,129) = 12.76$, $p < .001$, $\omega^2 = .08$ (see Figure 5). Participants receiving the CBI showed a moderate statistically significant decrease in panic from pre- to post-intervention, $t(64) = 3.74$, $p < .001$, $d = .54$, whereas control group participants showed no statistically significant change: $t(65) = 1.51$, $p = .14$, $d = .19$.

Mediational Analysis

A meditational analysis was performed, using the SPSS macro PROCESS (Hayes, 2013), to establish whether the changes in pre- to post-intervention scores for generalised anxiety and panic (a negative score indicates a decrease from pre- to post-intervention) were mediated by concurrent changes in pre- to post-intervention scores for test anxiety. The indirect effect of the intervention (0 = control, 1= CBI) on Δ generalised anxiety/ panic, via Δ test anxiety was estimated as an unstandardised regression coefficient and 95% confidence internals estimated using 1000 bootstrapped samples. A negative regression coefficient (and 95% CIs) indicates a reduction in generalised anxiety/ panic with a concurrent reduction in test anxiety. A statistically significant indirect effect is indicated by 95% confidence internals that do not cross zero (MacKinnon et al., 2007). Direct, indirect, and total effects are reported in Table 2. The reduction in generalised anxiety and panic following CBI was mediated by a concurrent reduction in test anxiety. The increase in school-related wellbeing was not mediated by test anxiety.

Discussion

The aim of the present study was to conduct a randomised control trial for a test anxiety CBI (STEPS) and examine whether a likely reduction in test anxiety extended to improved school-related wellbeing and reduced clinical anxiety (generalised anxiety and

panic), and whether any improved school-related wellbeing and reduced clinical anxiety was mediated by concurrent changes in test anxiety. A sample of secondary school students studying for high-stakes examinations were randomly allocated to CBI or a wait-list control group. Results showed that test anxiety, generalised anxiety, and panic, were all reduced following intervention, compared to the control group who showed smaller or no reductions. Furthermore, the reduction in generalised anxiety and panic was mediated by the reduction in concurrent test anxiety.

Test anxiety reduced from pre- to post-intervention for both control and CBI participants, however the CBI participants showed a larger reduction. These findings support *H1* and build on previous studies showing STEPS was an effective intervention for test anxiety (Putwain et al., 2014; Putwain & Prescod, 2018) as well as the evidence base more generally for the efficacy of CBI as an effective test anxiety treatment for populations of secondary school students (von der Embse et al., 2013). Results also provide indirect support for the S-REF model (Zeidner & Matthews, 2005). That is, when the cognitive, affective-physiological, and behavioural, mechanisms that underpin test anxiety, as described in the S-REF model, are targeted (e.g., challenging beliefs and avoidance behaviours), test anxiety reduces accordingly. In the present study it was not possible to discern which elements of the intervention were the most effective and it is entirely possible that some elements were more successful for some participants and different elements more successful in others.

It is also not clear why test anxiety reduced for all participants; this was not shown in previous studies (Putwain et al., 2014; Putwain & Prescod, 2018). One possibility is that general approaches to whole-school wellbeing, that have become increasingly popular in English secondary schools (Stirling & Emery, 2016), may have reduced test anxiety in all students. The schools included in the present study offered their students a variety of approaches to improve their wellbeing including yoga and mindfulness which have been

shown to reduce anxiety and stress in undergraduate students (Gallego et al., 2014) and secondary school students (Carsey & Heath, 2018), and test anxiety in undergraduate students (Lothes et al., 2019). Yoga and mindfulness could help to reduce self-critical thoughts and increase attentional control, both of which are key antecedents of test anxiety in the S-REF model (Zeidner & Matthews, 2005). While test anxiety may have reduced in all participants as a result of these wellbeing initiatives, the reduction was much larger for those receiving CBI.

Clinical anxiety reduced from pre- to post-intervention in CBI participants whereas reductions in control participants were minimal. Thus, CBI for test anxiety may extend to reducing both clinical and test anxiety. School-related wellbeing, however, increased from pre- to post-intervention in both CBI and control group participants. The time x intervention interaction was not statistically significant, and the CBI group showed only a marginally greater increase than control group, suggesting that the CBI did not impact on school-related wellbeing. These findings, therefore, offer partial support for *H2*. The finding that the reduction in clinical anxiety, but not the increase in school-related wellbeing, was mediated by the reduction in concurrent test anxiety, offers partial support for *H3*.

The reduction in clinical anxiety, mediated by the reduction in test anxiety, is consistent with the integrative network approach to anxiety disorders (Hereen & McNally, 2016, 2018) that symptom clusters are associated across an interconnected network. When central nodes, those symptoms that are densely and strongly connected to others such as worrisome thoughts regarding failure that are central to anxiety, are deactivated through successful CBI, the networks associated with central nodes are also deactivated. Accordingly, the reduction in the activation of worry about failure extends to generalised anxiety and panic. From this perspective, high levels of trait anxiety are a risk factor for clinical anxieties; reducing test anxiety reduces the risk of generalised anxiety and panic symptoms.

The finding that school-related wellbeing was unrelated to the CBI is likely the result of wellbeing judgements being holistic and test anxiety is just one element (Hascher, 2003, 2010). Even though test anxiety and school-related wellbeing are related (Hascher, 2007) changing one contributor to school-related wellbeing, namely test anxiety, may not be sufficient to change the global judgement of wellbeing if other elements contributing to wellbeing remain static, or perhaps move in an opposing direction. It is also notable that the increase in school-related wellbeing for both CBI and control participants is consistent with our speculation that the reduction in test anxiety across CBI and control groups is attributable to whole-school approaches to improving well-being.

Limitations and Directions for Future Research

There are three limitations of the study to highlight. First, as STEPS was a multimodal approach to CBI it is not known if specific elements of the intervention are more or less effective. Future research should consider the inclusion of mediators to ascertain the relative contributions of cognitive, affective, and behavioural, elements included in STEPS (and indeed for other interventions too). Identifying the mechanisms that lead to change is beneficial for refining future interventions and advancing theoretical models of test anxiety (Powers, deKleinem, & Smits, 2017). It is possible, as we note above, that some CBI mechanisms may be more beneficial for some participants than others (one of the benefits of a multi-modal approach). With a sufficient sample size, it would also be beneficial for future studies to incorporate person-centred analyses (e.g., cluster or latent profile analysis) to establish if intervention mechanisms (of STEPS and other test anxiety CBIs) are more or less effective for a particular test anxiety profile. Second, the present study focused exclusively on outcomes and did not consider processes that may have contributed to successful intervention (e.g., implementer characteristics, quality of intervention delivery, and participant

engagement). Future studies should assess, where possible, if such factors moderate the impact of STEPS (and other test anxiety CBIs).

Third, the sample was biased in favour of female students. Female students are more likely to report high levels of test anxiety (Putwain, 2007; Putwain & Daly, 2014) as well as clinical anxiety symptoms more generally (Ohannessian et al., 2017). On the basis of the present study we cannot ascertain whether STEPS is equally effective for male and female students. It is possible that female students were more receptive to the anxiety management strategies included in STEPS, or those anxiety management strategies targeted the reasons that female students were more anxious more effectively that the reasons male students were more anxious. If this were the case STEPS would be more effective with female students. Future studies with larger samples could test this possibility by testing for interactions with gender and by including measures of coping such as avoidance (Panayiotou et al., 2017) that are believed to underpin gender differences in anxiety.

Conclusion

The present study has demonstrated that a test anxiety CBI (STEPS) can reduce clinical anxiety as a result of reducing test anxiety. This suggests high levels of test anxiety can be a risk factor for clinical anxiety and supports the integrative network approach to anxiety disorders. When central symptom nodes (worry about failure) are deactivated associated networks of anxiety symptoms are also deactivated. The CBI did not, however, contribute to improved school-related wellbeing. This is a likely result of test anxiety being just one component of the much broader construct of wellbeing.

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Table 1

Means and Standard Deviations for Pre- and Post-intervention Test Anxiety, School-Related Wellbeing, Panic, and Generalised Anxiety, for Intervention and Control Groups.

	Intervention		Control	
	M	*SD*	*M*	*SD*
Pre-intervention Scores				
Test Anxiety	61.45	9.94	63.03	5.75
School-related Wellbeing	15.19	4.84	15.38	5.17
Generalised Anxiety	12.01	3.93	12.33	3.14
Panic	18.01	7.57	18.83	5.19
Post-intervention Scores				
Test Anxiety	53.43	11.33	60.06	4.72
School-related Wellbeing	17.19	5.14	15.86	5.25
Generalised Anxiety	10.01	4.18	12.11	3.70
Panic	13.45	7.42	18.23	5.78

Table 2

Tests of Indirect Effects to Establish if Change in Generalised Anxiety and Panic, Following Intervention, was Mediated by Change in Test Anxiety.

	B	*SE*	95%CIs
School-Related Wellbeing			
Direct	1.23	.77	-0.30, 2.75
Indirect	0.28	.35	-0.47, 0.99
Total	1.51	.73	0.68, 2.96
Generalised Anxiety			
Direct	-1.08	0.59	-2.24, 0.09
Indirect	-0.71	0.30	-1.55, -0.27
Total	-1.79	0.59	-2.95, -0.63
Panic			
Direct	-2.00	1.04	-4.06, 0.06
Indirect	-1.96	0.72	-3.86, -0.88
Total	-3.96	1.11	-6.16. -1.77

Figure 1
Participant Flow Chart

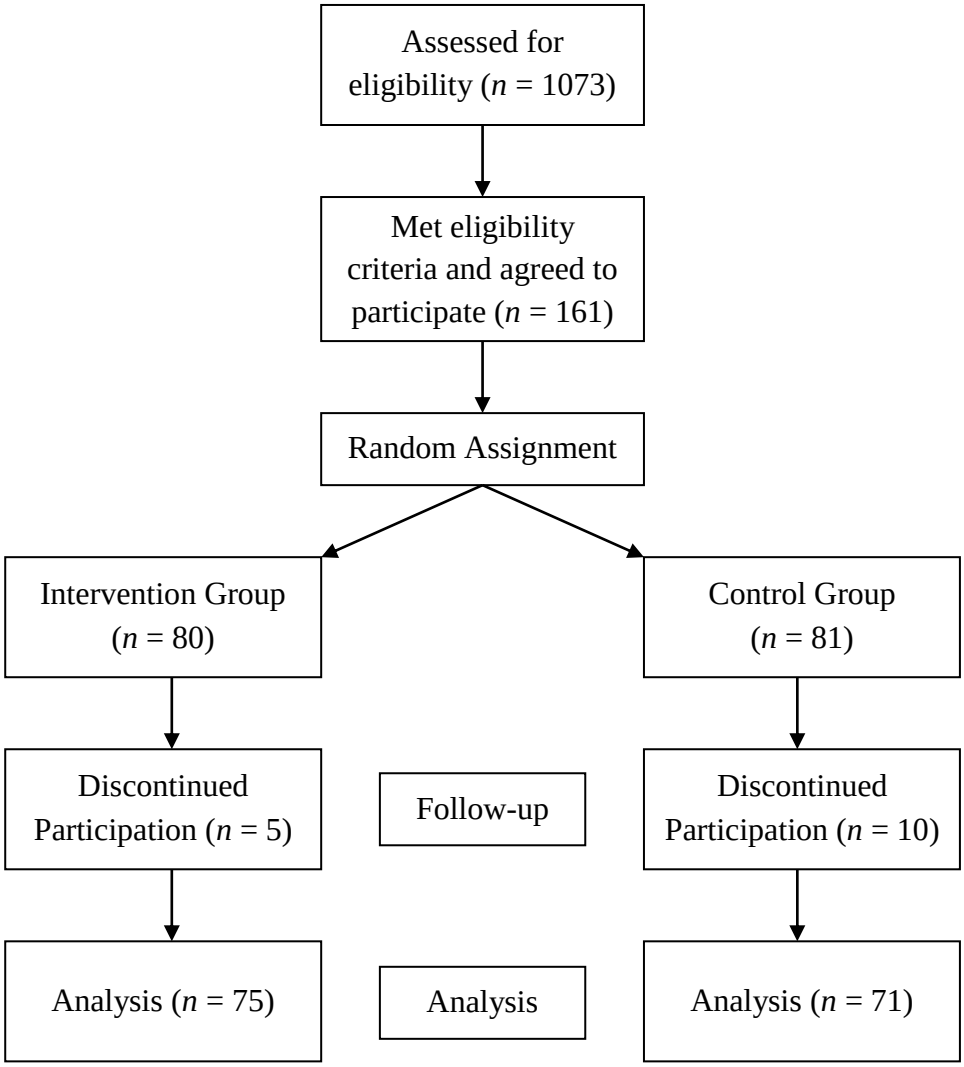

Figure 2

The Interaction Between Measurement Point and Intervention Group for Test Anxiety

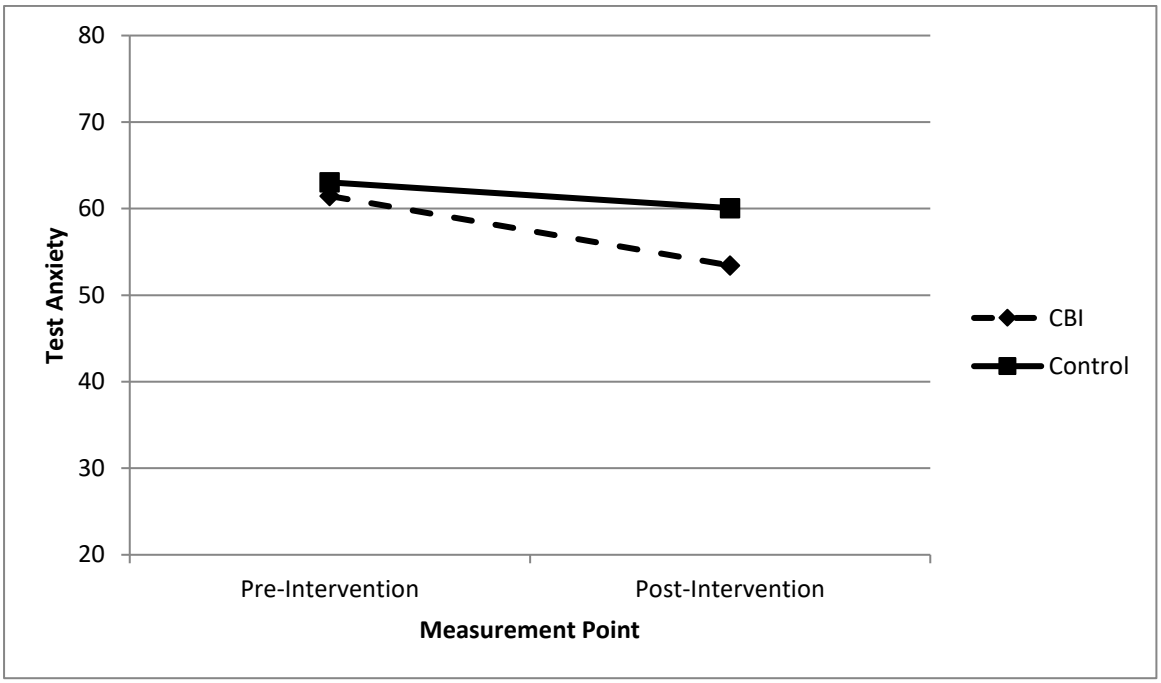

Figure 3

The Interaction Between Measurement Point and Intervention Group for School-Related Wellbeing

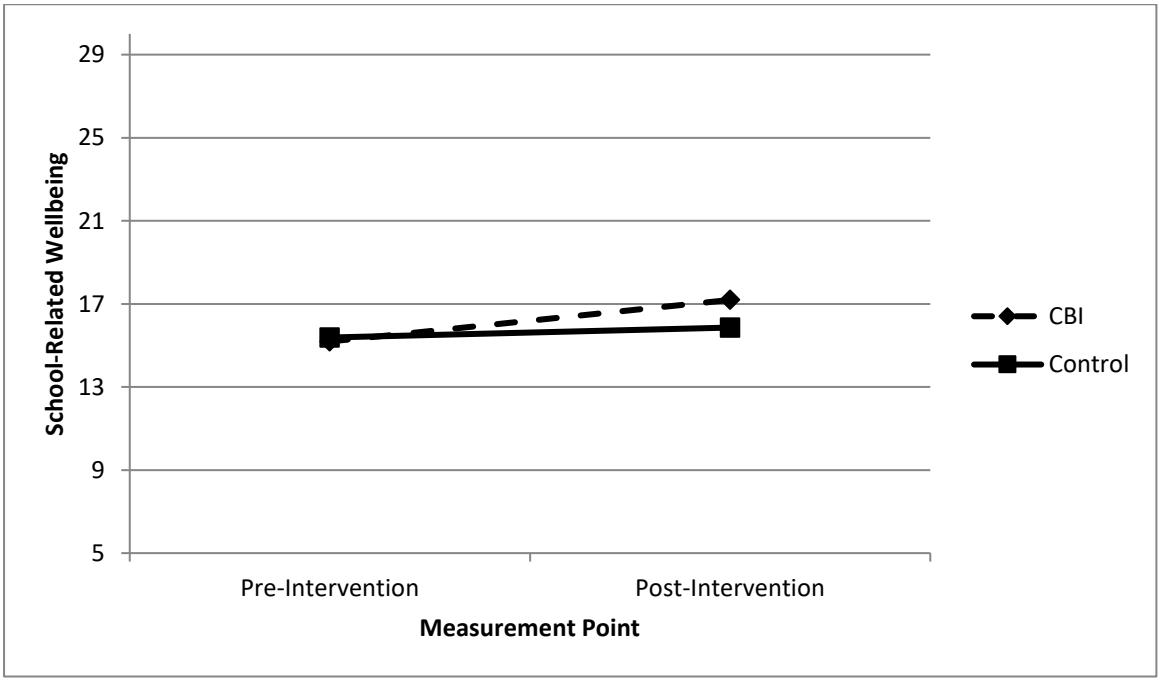

Figure 4

The Interaction Between Measurement Point and Intervention Group for Generalised Anxiety

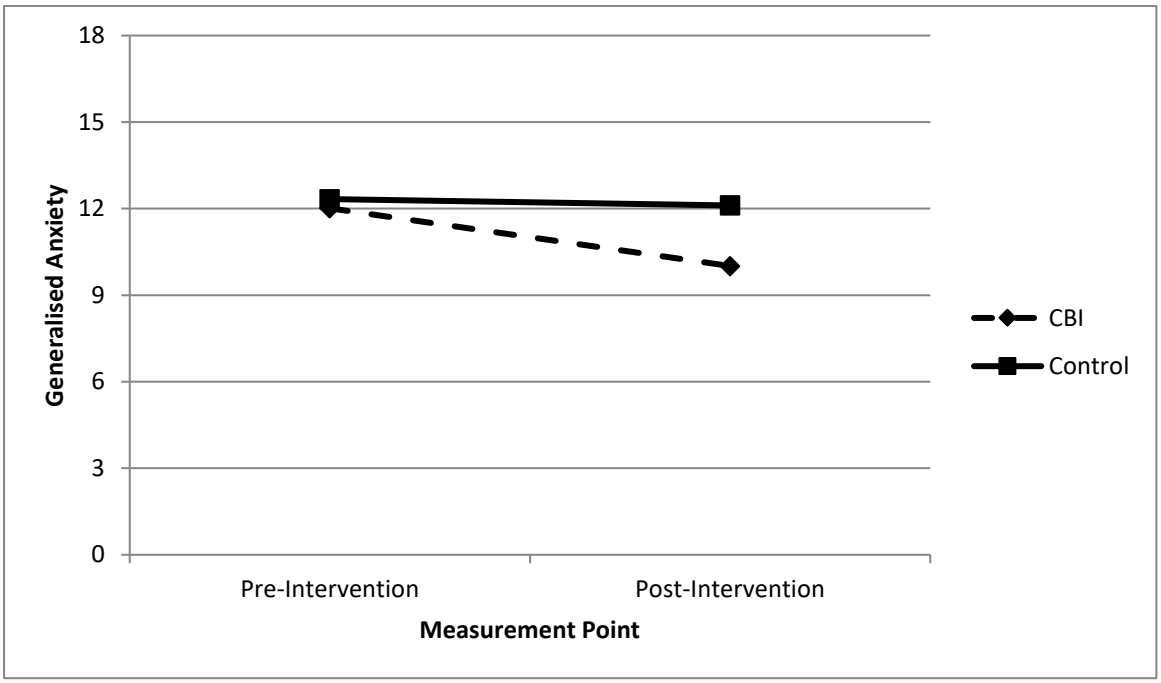

Figure 5

The Interaction Between Measurement Point and Intervention Group for Panic