**ARTICLE**

# Academic Stress in the Final Years of School: A Systematic Literature Review

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## Abstract

Heightened academic stress in the final years of schooling is a common concern, yet little is known about how stress changes over time and what individual, school and family factors are associated with distress. We conducted a systematic review to examine the nature of distress in students in their final two years of secondary school. Sixty studies were eligible for inclusion. The main findings indicated severity of distress differed across the 17 countries sampled and measures used. There was some consistencies suggesting about 1 in 6 students experienced excessive distress. Female gender and anxiety proneness were consistently associated with increased distress, and freedom from negative cognitions with reduced distress. There was some evidence that individual characteristics (perfectionism, avoidance, coping, self-efficacy, resilience), lifestyle (sleep, homework), school, family and peer connectedness were associated with distress. Overall at-risk students can be predicted by theoretical models of anxiety and distress targeted with psychological interventions.

**Keywords** Academic stress · Examinations · Senior school · Test anxiety · High stakes testing

Academic stress is a common concern for youth; with tests, homework and grades being the biggest stressors reported by secondary school students [1, 2]. Academic stress in the final years of high school has received particular attention and has been found to be associated with very high levels of distress in large samples in Australia [e.g. 3], the Netherlands [4], the United Kingdom [e.g. 5], and the United States of America [6]. In these countries and others (e.g. broader Europe, East and South Asia, Canada) the final year or two years of school involves a series of examinations and the performance on these examinations forms the basis for an educational certificate, pre-university program, or university entrance scores. Due to the large contribution of examination performance on the overall mark (for example over 50% in Australia), these examinations are often referred to as *high stakes tests*, and these examinations seem to be particularly relevant to increased levels of stress reported by students [7–9].

Although there are many reports of heightened levels of distress in students in the final years of secondary school, little is known about the nature of this distress, whether it is excessive and what individual, school-based or family factors exacerbate or lessen this distress. This is an important issue for educators who are responsible for the wellbeing of students, but also because research indicates that heightened distress can impede academic performance [10]. It is also unclear whether the distress is limited to the examinations per se, or is associated with other factors such as increases in workload, increased expectations for independence in learning, or personal, family or other school based factors. This is particularly unclear as most research has examined distress using measures of test anxiety. Although test anxiety refers to a fear of completing tests or exams [11]; common measures of test anxiety have been shown to capture anxiety more broadly with high scores overlapping with anxiety disorders (such as generalised anxiety disorder, social phobia), trait anxiety and general anxiety proneness [for reviews see: 12, 13]. It is therefore not clear whether the high levels of test anxiety found in senior school samples [e.g. 5] relates to examinations specifically, or perhaps reflects general high levels of distress associated with the academic pressures of the final years of schooling more broadly, or in fact, predominantly capture students with likely anxiety disorders.

Developmental models of psychopathology suggest biological by environment interactions play an important role in distress during the adolescent period [14, 15].

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Environmental stressors associated with senior school and high stakes examinations may interact for biologically vulnerable students to exacerbate or trigger underlying stress vulnerability. These factors might be school based (e.g. increased learning requirements, pressure to perform), home based (e.g. pressure to perform, diet, sleep routines), peer group based (e.g. social evaluation concerns, social contagion of stress) or other. Developmental models of child anxiety [16, 17] highlight the role of individuals' cognitive and behavioural responses to these stressors, as well as parental responses, in exacerbating or reducing the perceived threat of these environmental stressors. With adolescent distress showing clear trajectories for adult mental disorders [15], it is important to better understand the nature of the distress experienced by senior school students.

Given the importance of understanding the factors associated with heightened distress in senior students, the aim of this review was to examine the literature in order to understand the severity of the distress experienced by students in the final years of secondary school, how distress changes over time, and to understand the factors that contribute to or protect students from excessive distress. To the best of our knowledge this is the first review to examine this issue.

## Method

### Search Strategy and Selection of Studies

A systematic literature search was carried out using the Psycinfo (American Psychological Association) 1806 to April 2018 and Education Resources Information Centre (ERIC; Institute of Education Sciences) 1966 to April 2018 databases as they were considered to be the most relevant for the topic. The reference lists of relevant articles were also used to source additional articles relevant to the review. Keywords selected for the search terms were related to hypothesised predictors and outcomes of stress in final year high school students. The final search included terms related to high school (high school, secondary school, senior school, HSC, high school certificate), distress (anxiety, anxious, test anxiety, fear, stress, distress, coping, burnout, resilien$), and academic-related stress (exam$, examination$, test$, academic pressure, academic hardiness, academic buoyan$, fear appeal, perfectionis$).

Eligible articles were: published in English in peer-reviewed journals, reported distress or emotional wellbeing variables as related to academic stress in high school students in their final two years of schooling (e.g. Grade 10/11, 11/12, 12/13 depending on the country). For studies that included a broader school grade range they were included if they reported subgroup analyses related to senior students in the final two years of schooling. Articles were excluded

if they primarily examined scale psychometrics, or were focused solely on special populations unrepresentative of the general population (e.g. deaf students, students with cystic fibrosis) and were not specifically related to understanding the distress associated the final years of school. Both qualitative and quantitative studies were included.
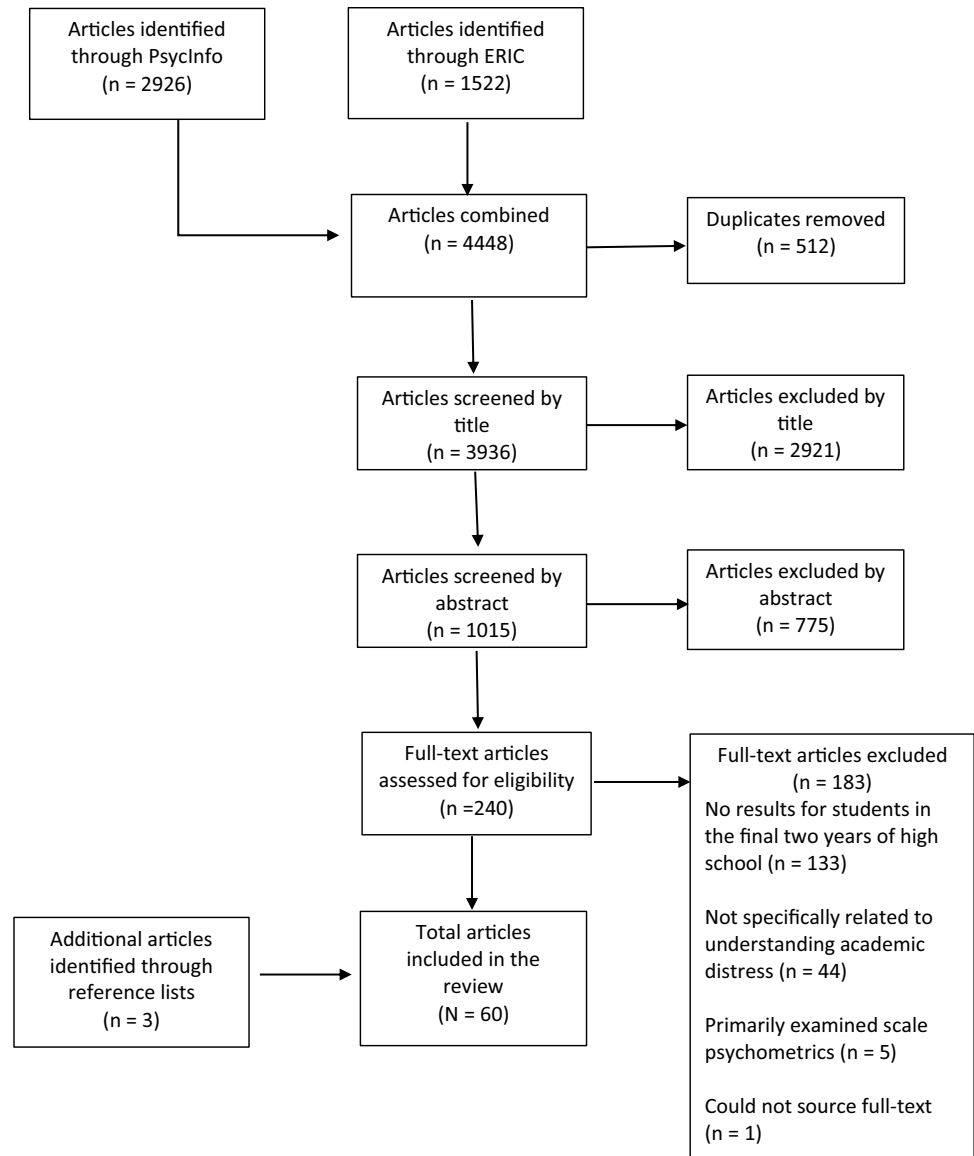
### Data Extraction and Analysis

All articles retrieved from the database searches were uploaded into citation management software, EndNote. Duplicates were removed automatically. The inclusion and exclusion of articles based on their title, then abstract, then full-text was overseen by two authors (VA, TJ) with discrepancies discussed with VW. In addition, references from retrieved papers were checked for relevant studies. A total of 60 articles were eligible for the current systematic literature review. Data pertaining to the sample (participants, age, gender, type of school, country), study method (qualitative, quantitative, measures used, timing of measurement), and outcomes (ranges and means on relevant distress measures, relationships between key variables) were extracted. Quantitative data on mean distress scores over time on the same outcomes measures were used where possible to calculate overall mean distress for the total sample. Other findings were pooled to form a narrative review of the findings. Figure 1 outlines the search and selection process based on the PRISMA guidelines [18]. Table 1 summarises the studies included in the review.

The quality of the studies were assessed using the Critical Appraisal Skills Programme (CASP) Cohort Study checklist [19] and Qualitative Study checklist [20]. The CASP checklists do not provide a scoring system so instead each study was rated against each of five study quality criteria as meeting/not meeting the criteria or rated as unclear. For Cohort studies the quality criteria were: (1) examined a focused issue, (2) appropriate sample, (3) unlikely measurement bias, (4) appropriate design/confounds considered, and (5) appropriate analysis/interpretation of results. Similarly, for Qualitative Studies the quality criteria were: (1) clear aims, (2) appropriate sample, (3) appropriate methodology, (4) confounds considered, (5) appropriate analysis/interpretation of results. Quality was assessed by two raters (VW, TJ) and disagreements were solved through discussion. See Table 2 for the quality ratings.

## Results

Sixty articles were found that met eligibility criteria (see Table 1). They reported on qualitative and quantitative studies that investigated the distress experienced by

**Fig. 1** Flow diagram



Articles identified through PsycInfo (n = 2926)

Articles identified through ERIC (n = 1522)

Articles combined (n = 4448)

Duplicates removed (n = 512)

Articles screened by title (n = 3936)

Articles excluded by title (n = 2921)

Articles screened by abstract (n = 1015)

Articles excluded by abstract (n = 775)

Full-text articles assessed for eligibility (n = 240)

Full-text articles excluded (n = 183)
No results for students in the final two years of high school (n = 133)

Not specifically related to understanding academic distress (n = 44)

Primarily examined scale psychometrics (n = 5)

Could not source full-text (n = 1)

Additional articles identified through reference lists (n = 3)

Total articles included in the review (N = 60)

students in the final two years of schooling as well as the factors that influenced their distress.

## Study Characteristics

Studies were conducted across 17 countries: Australia (n = 12), United Kingdom (n = 15), Turkey (n = 11), United States of America (n = 7), Canada (n = 3), the Netherlands (n = 1), New Zealand (n = 1), Germany (n = 1), Italy (n = 1), Brazil (n = 1), Nigeria (n = 1), Iran (n = 1), Portugal (n = 1), Malaysia (n = 1), Ireland (n = 1), India (n = 1) and one study that compared cohorts in USA and Korea. Methodologies varied across studies: five studies used a longitudinal design, 55 were cohort studies, and five used qualitative analyses.

## Quality Assessment

The quality of the 60 included studies varied considerably (see Table 2). Only 26 studies were rated highly on all categories. Most studies reported a clear study aim or described a focused issue of study. Most studies also had adequate samples for the study aims. Measurement bias was not a concern in the qualitative studies, with the risk of measurement bias mixed for the cohort studies, with common concerns related to the reliability and validity of measures used. Confounds were considered in only some studies, in particular confounds related to differences in timing of measurement in relation to the exams, differences in schools or students sampled were often ignored. Finally, the use of appropriate analysis and interpretation of results was consistently better in the qualitative studies, with very mixed quality ratings

**Table 1** Articles included in the review

| Authors | Sample | Sample size | Sample age | Measures used | Summary of findings for senior students |
|---|---|---|---|---|---|
| Akca [23] | Turkish students preparing for the High School Placement Test (HSPT) and University Entrance Exam (UEE) | 319 preparing for HSPT 389 preparing for UEE | Range 12–14 years (Preparing for HSPT) Range 16–19 years (Preparing for UEE) | Learned Helplessness Scale for Children Test Anxiety Scale | Females had significantly higher test anxiety than males Test anxiety and learned helplessness was significantly higher for students preparing for HSPT than UEE. Suggests older students are better able to cope No relationship between test anxiety and learned helplessness |
| Akcoltekin [95] | Turkish high school students in grade 12 (final year) | 270 | Unreported | Time Management Inventory Research Anxiety Scale | Poorer time management was associated with higher research anxiety |
| Astill et al. [96] | Amsterdam high school students (final year) | 24 | $M = 17.63$ ($SD = 0.10$) | Actigraphy Daily questions on stress, fatigue, and subjective sleep quality Daily number of exams and alcoholic and caffeinated drinks | Sleep time, efficiency, and subjective quality was significantly reduced during stressful exam periods, relative to exam-free periods |
| Aysan et al. [66] | Turkish high school students (juniors and seniors) preparing for exams | 59 juniors 54 seniors | $M = 15.8$ (juniors) $M = 17.4$ (seniors) | Perceived Health Scale Test Anxiety Inventory Coping Strategies Scale | Students with higher test anxiety perceived their health to be poorer Students who engaged in self-blame, wishful thinking, or avoidance coping strategies tended to have higher test anxiety |
| Byrne [53] | Australian high school students (grades 7, 9, 12) | 224 | Range 12 – 18 years ($M = 15.05$, $SD = 4.63$) | The Fear Survey Schedule for Children The Rosenberg Self-Esteem Scale State-Trait Anxiety Inventory—Trait Scale Home life (parental employment, number and gender of sibling, family structure) | No gender differences in self-esteem in year 12 From year 7 to 12, anxiety significantly increased for girls and decreased for boys In year 12, boys and girls used different coping strategies: Girls were significantly more anxious than boys, boys' coping strategies appeared to reduce anxiety and fear |

**Table 1** (continued)

| Authors | Sample | Sample size | Sample age | Measures used | Summary of findings for senior students |
|---|---|---|---|---|---|
| Chin et al. [69] | New Zealander high school students (grades 12, 13) | 188 | Range 16–19 years (M = 16.80, SD = 0.72) | Affect and Arousal Scale Reactions to Tests Examination Performance | Negative affect contributed to higher test anxiety. Higher test anxiety was associated with poorer exam performance. Compared to boys, girls had higher exam grades and higher levels of test anxiety and emotionality |
| Christensen [65] | American high school students (senior year) | 94 | Range 16 – 19 years (M and SD unreported) | Debilitating Anxiety Scale – Revised | Students in accelerated classes had lower test anxiety than students in "low stream" (low achieving) classes. Compared to boys, girls had higher test anxiety |
| Chukwuorji and Nwonyi [54] | Nigerian secondary school students (candidates for high-stakes examinations) | 281 | Range 16–19 years (M = 17.05, SD = 1.87) | State Self-Esteem Scale Test Anxiety Inventory Socio-demographic information | Students whose parents had higher-status jobs were more test anxious. Students with lower self-esteem had higher test-anxiety. No gender differences in test anxiety |
| Çirak [73] | Turkish high school students (final year) | 23 | Range 17–18 years (M and SD unreported) | Semi Structured Interviews | Students frequently reported emotional and physiological anxiety about exams. Test anxiety was related to perceived pressure from family expectations and the idea of absolute success or failure |
| Cunha and Paiva [27] | Portuguese high school students (grades 10, 11, 12) | 449 | Range 15–21 years (M = 16.28, SD = 1.17) | Socio-demographic information Test Anxiety Inventory Forms of Self-Criticising and Self-Reassuring Scale Social Anxiety and Avoidance Scale for Adolescents Children's Acceptance and Mindfulness Measure | Lower test anxiety was associated with higher self-reassurance, acceptance, and mindfulness. Higher test anxiety was associated with high self-criticism, high social anxiety, low self-reassurance, and low acceptance and mindfulness skills. Girls had higher test anxiety than boys. Test anxiety was significantly higher for students with mid-SES levels, relative to high-SES students |

**Table 1** (continued)

| Authors | Sample | Sample size | Sample age | Measures used | Summary of findings for senior students |
|---|---|---|---|---|---|
| Daly et al. [115] | English sixth-form college students (in their first year of their A-level qualification) | 39 | $M = 17.31$ $(SD = .047)$ | Raw mark on a mock A-level examination Results in the GCSE Test anxiety questionnaire Heart rate data | Students with higher levels of test anxiety performed worse in their GCSE, on average No relationship found between heart rate and test anxiety |
| Einstein et al. [29] | Australian high school students (grade 12) | 772 | Range 15–24 years ($M = 17.6$, $SD = 0.6$) | Multidimensional Perfectionism Scale Depression Anxiety Stress Scales Self-report of hours spent studying, motivation, country of birth | Depression, anxiety, and stress symptoms increased significantly as exams came closer, with 20% of the sample falling into the severe range Students of immigrant parents reported higher socially-prescribed perfectionism, which was positively related to depression and anxiety |
| Erzen and Odaci [56] | Turkish students in their final year of high school | 180 | Range 16–19 years ($M = 17.3$, $SD = 0.53$) | Test Anxiety Inventory Relationships Scales Questionnaire Self-Efficacy Scale Personal Information Form | A secure attachment style was related to lower test anxiety A fearful or dismissing attachment style was related to higher test anxiety Students with low self-efficacy had higher test anxiety Female students had higher test anxiety than males |
| Flett et al. [85] | Canadian secondary school students (grades 11 and 12) | 73 | Range 16–18 years ($M = 16.8$, $SD$ unreported) | Child-Adolescent Perfectionism Scale Adolescent and Adult Type A Behavior Scale Perceived Self-Efficacy Scale Children's Depression Inventory Psychosomatic Symptom Scale | Depression was associated with higher self-oriented perfectionism, more Type A behaviour, and lower self-efficacy |
| Guner-Kucukkaya and Isik [24] | Turkish high school students in grades 9, 10, and 11 | 728 | Unreported | Demographic information form Brief Symptom Inventory, Global Severity Index (GSI) | Students in year 11 had significantly higher GSI scores than students in grades 9 and 10 |

Table 1 (continued)

| Authors | Sample | Sample size | Sample age | Measures used | Summary of findings for senior students |
|---|---|---|---|---|---|
| Hodge et al. [21] | Australian high school students (grades 11 and 12) | 445 | Unreported | Questionnaire on: Biographical and personal characteristics, school characteristics, academic self-concept and expectation of HSC outcome, coping practices, and perceptions of support<br>State-Trait Anxiety Inventory-Trait<br>General Health Questionnaire (GHQ)<br>Adolescent Coping Scale-Short Form<br>Self-Description Questionnaire III | Almost half of all the students reported "at risk" levels of distress<br>Year 12 students about to undertake major examinations reported the highest levels of distress. Females had higher levels of distress than males, and students from a non-English speaking background had higher levels of stress than students from English speaking backgrounds<br>Students who had higher trait anxiety, lower self-confidence, lower socio-economic status, lower academic self-concepts, or less effective coping strategies were more likely to report higher levels of distress<br>Trait anxiety was the strongest predictor of examination distress |
| Karatas et al. [57] | Turkish high school students (final year) | 194 | M = 17.5 | Test Anxiety Inventory<br>Scores on the university entrance exam<br>Grade Point Average (GPA) | Females had significantly higher test anxiety than males<br>Females with higher test anxiety performed worse on their university entrance exam |
| Kouzma and Kennedy [94] | Australian senior high school students | 369 | Range 16–18 years (M = 16.6, SD = 0.60) | 1-week homework diary<br>Self-report stress scale<br>Profile of Mood States | Compared to boys, girls spent significantly more time doing homework, and reported significantly higher levels of stress and mood disturbance<br>Hours spent on homework was significantly positively associated with stress and mood disturbance |

**Table 1** (continued)

| Authors | Sample | Sample size | Sample age | Measures used | Summary of findings for senior students |
|---|---|---|---|---|---|
| Kouzma and Kennedy [74] | Australian final year students (year 12) | 423 | Range 16–18 years ($M = 17.3$, $SD = 0.6$) | Academic Stress Questionnaire | Main sources of stress included examinations and results, too much to do, worry over future, making choices about career, studying for examinations, amount to learn, need to do well imposed by others, and self-imposed need to do well |
| Lay et al. [30] | Canadian students in final year (Year 13) | 63 | Unreported | Endler Multidimensional Anxiety Scales (state and trait forms) Procrastination scale Threat, challenge, harm, and gain appraisals Ways of Coping Scale | State anxiety was positively related to threat appraisals and harm appraisals Emotion-focused coping was related to higher state anxiety Prior to and during a stressful exam period, students reported the highest levels of threat appraisals State anxiety was highest one day before their first final exam. State anxiety was lowest five days after their last exam |
| Lee and Larson [48] | Korean and USA high school seniors preparing for university entrance exam (year 12) | 56 in Korea, 62 in USA | $M = 17.8$ (Korea) $M = 17.0$ (USA) | Children's Depression Inventory Experience Sampling Method self-report diary (activities, affect) | Korean students had significantly higher levels of clinical depression than USA students Korean students spent significantly more time (2x) on schoolwork. USA students spent more time in leisure activities Korean students reported more negative emotional states during daily activities and schoolwork, which was related to depression |

**Table 1** (continued)

| Authors | Sample | Sample size | Sample age | Measures used | Summary of findings for senior students |
|---|---|---|---|---|---|
| Leonard et al. [6] | USA senior private school students (year 11) | 128 | $M = 16.37$ $(SD = 0.62)$ | Socio-demographic and background information<br>mtvU/Associated Press survey<br>Help with stress (developed by authors)<br>Self-Report Coping Scale<br>Academic Motivation Scale<br>Parental Expectations subscale of the Multidimensional Perfectionism Scale<br>Quick Depression Assessment of PHQ-9<br>Communities that care youth survey | Greatest sources of stress were grades, homework, and preparing for college<br>Grades were a significantly greater source of stress for females than males<br>49% of students reported feeling a great deal of stress on a daily basis<br>Females reported significantly higher stress than males<br>Females more likely to use problem-focused coping and emotion-focused internal avoidance coping<br>Males more likely to report emotion-focused external avoidance coping<br>Greatest source of support identified as friends, followed by family members, followed by school staff<br>26% of students had clinical levels of depression<br>38% of students reported drinking alcohol to get drunk in the last week<br>Substance use was significantly associated with high levels of stress |

**Table 1** (continued)

| Authors | Sample | Sample size | Sample age | Measures used | Summary of findings for senior students |
|---|---|---|---|---|---|
| Lin and Yusoff [43] | Malaysian students in final year of high school (upper 6) | 382 | Aged 19 (M, SD and range unreported) | Sociodemographic information GHQ-12 Secondary School Stressor Questionnaire Brief Coping Orientation of Problem Experienced | 47.6% of students reported psychological distress (2.5×higher than WHO expected) The top ten stressors perceived by students were related to academia (e.g. "Afraid of not getting university placement") Positive reinterpretation was a protective factor (negatively correlated with the development of distress) Risk factors included behavioural disengagement, self-blame, denial, venting, self-distraction (significant positive relationship with distress) |
| Locker and Cropley [28] | English high school students (grades 9 and 11) | 508 | (Reported separately for gender and school-type) M = 13.9–16.8 (SD = .428—.725) | Positive and Negative Affect Schedule Children's Depression Inventory Revised Children's Manifest Anxiety Scale Rosenberg Self-Esteem Scale | Immediately prior high-stakes examinations, females were significantly more anxious (in terms of worry and physiological anxiety) than males. Females also showed higher levels of negative affect and distress at this time Students at all girls schools had higher anxiety and negative affect prior to exams, relative to students attending mixed and all boys schools |
| Lushington et al. [59] | Australian students in senior high school (years 11 and 12) | 398 | (Reported separately for gender and ethnicity) | Questionnaire (demographics, sleep habits, extracurricular activity, academic expectations, stress, mood, coping, diet, pubertal development) 6-item Depressive Mood Scale 4-item Brief Resilient Coping Scale 4-item Study and Interpersonal Stress subscale from the Student-life Stress Inventory | No main effects for culture or gender on sleep quality Females had significantly higher depressive mood and study/interpersonal stress than males Among Caucasian Australians, higher study stress was related to higher daytime sleepiness On school nights, Asian Australians slept less (went to bed later and woke up earlier) than Caucasian Australians |

Table 1 (continued)

| Authors | Sample | Sample size | Sample age | Measures used | Summary of findings for senior students |
|---|---|---|---|---|---|
| Manley and Rosemier [64] | American school students (grades 7 to 12) | 2,086 (Grade 12 n = 351, Grade 11 n = 291) | Unreported | Test Anxiety Scale for Children General Anxiety Scale for Children | Girls had significantly higher test anxiety than boys at every grade level<br>No significant differences in test anxiety between grades 11 and 12 |
| McCann and Meen [72] | Canadian high school students (grades 11 and 12) | 222 | Unreported | State-Trait Anxiety Inventory (STAI)<br>Intellectual ability (Raven's Progressive Matrices and Canadian Lorge-Thorndike intelligence test)<br>Academic achievement (final English grades) | Higher anxiety was associated with lower intellectual ability<br>Higher anxiety was associated with lower achievement for students with lower intellectual ability<br>Higher anxiety was associated with greater achievement for students with higher intellectual ability |
| McGraw et al. [3] | Australian high school students (grade 12) | 941 | Range 16 – 19 years (M = 17.4, SD = 0.6) | Demographics<br>Psychological Sense of School Membership<br>Family Connectedness Self-Report<br>UCLA-R Loneliness Scale<br>Depression Anxiety Stress Scales-21 | More than 12% were severely or extremely depressed<br>More than 20% were severely or extremely anxious<br>More than 10% were severely or extremely stressed<br>Lower connectedness to school, family and peers was associated with higher levels of stress, depression, anxiety, and negative affect<br>Higher connectedness to school, family and peers was a protective factor against stress, anxiety, and depression<br>Girls reported stronger peer connectedness than boys, but were significantly more stressed and anxious |
| Moulds [25] | Australian high school students (grades 7, 9 and 11) | 1137 | Unreported | Main daily hassle in current term<br>Student Stress Inventory<br>Actual Classroom Environment Scale<br>Rosenberg Self-Esteem Scale<br>Demographic information | Students in grade 11 were significantly more anxious than those in grades 7 and 9 |

**Table 1** (continued)

| Authors | Sample | Sample size | Sample age | Measures used | Summary of findings for senior students |
|---------|--------|-------------|-----------|---------------|------------------------------------------|
| Peluso et al. [31] | Brazilian senior high students preparing for the university admission exam | 222 | Median age = 17 years (*M* and *SD* unreported) | Positive and Negative Affect Schedule – Expanded form (PANAS-X) Time spent studying | Negative affect significantly increased as the high-stakes exam drew nearer Mood correlated with time spent studying: Negative affect was higher for students who spent more time studying |
| Putwain [8] | English secondary school students (grades 10 and 11) | 34 | Range 14–16 years (*M* and *SD* unreported) | Semi-structured interviews | Examination anxiety was reportedly influenced by an anxious disposition and perceived assessment importance Academic stress was reportedly influenced by deadlines, workload, motivation to achieve, and fear of failure Examination anxiety reportedly resulted in difficulty remembering information during exams |
| Putwain [52] | English high school students (grades 10 and 11) | 1348 | Unreported | Test Anxiety Inventory Student Profile Questionnaire | Females had significantly higher test anxiety than males Ethnicity influenced test anxiety; Students from White ethnic backgrounds had lower levels of test anxiety than students from Black, Asian, and other ethnic backgrounds Students for whom English was their second language had higher test anxiety |
| Putwain [49] | English secondary school students (grades 10, 11) | 615 | Range 14–16 years (*M* and *SD* unreported) | State Test Anxiety Scale Examination Performance Examination Stakes (high, mid, low) | Higher test anxiety, worry, and emotionality were all associated with poorer exam performance Students reported lowest levels of test anxiety and attained highest grades for mid-stakes exams |

**Table 1** (continued)

| Authors | Sample | Sample size | Sample age | Measures used | Summary of findings for senior students |
|---|---|---|---|---|---|
| Putwain [50] | English high school students (grade 11) | 557 | Range 15–16 years (*M* and *SD* unreported) | Test Anxiety Inventory Office for National Statics categorical scale of socio-economic background Grade on GCSE examinations | Females had significantly higher test anxiety than males Higher test anxiety was associated with poorer exam performance Students from a higher socio-economic background had lower test anxiety and higher exam grades than students from lower socioeconomic backgrounds |
| Putwain [75] | English secondary school students (grades 10, 11) | 34 | Range 14–16 years (*M* and *SD* unreported) | Semi-structured Interviews | Gender differences in self-efficacy were evident across different subjects Test anxiety was reportedly caused by fear of failure, high career aspirations, pressure from teachers, and low self-efficacy Preparation, self-confidence, and an expectation of success appeared to be protective factors against test anxiety |
| Putwain and Aveyard [82] | English students in their final year (Year 11) | 270 | *M* = 15.01 (*SD* = 0.89) | Revised Test Anxiety Scale Academic Buoyancy Scale Motivation and Engagement Scale Study Management and Academic Results Test Examination grades (GCSE) | At low levels of worry, students with higher perceived control performed better on the exam, relative to students with low perceived control At high levels of worry, level of perceived control did not influence exam performance |
| Putwain and Daly [5] | English secondary school students (grades 9, 10, 11) | 2435 | Range 14–16 years (*M* and *SD* unreported) | Revised Test Anxiety Questionnaire Friedben Test Anxiety Scale | 16.4% of all students reported high levels of test anxiety Girls were more likely than boys to be highly test anxious, worried, tense, and concerned about being negatively judged by others |

**Table 1** (continued)

| Authors | Sample | Sample size | Sample age | Measures used | Summary of findings for senior students |
|---------|--------|-------------|-----------|---------------|------------------------------------------|
| Putwain and Symes [89] | English secondary school students (grade 11) | 273 | $M = 15.5$, ($SD = 0.45$) | Teacher's Use of Fear Appeals Questionnaire Revised Test Anxiety Questionnaire Achievement Goals Questionnaire Exam performance | Students who perceived teachers' fear appeals as threatening performed worse in the high-stakes exam Students with a mastery-approach achievement goal performed better on the exam that students with a performance-avoidance achievement goal |
| Putwain and Symes [103] | English secondary school students (grades 10, 11) | 132 | Grade 10 $M = 14.7$ ($SD = 0.5$) Grade 11 $M = 15.5$ ($SD = 0.5$) | Teacher's Use of Fear Appeals Questionnaire Revised Test Anxiety Scale Achievement Goals Questionnaire | Students who perceived teachers' fear appeals as threatening showed higher test anxiety |
| Putwain et al. [79] | English high school students (grade 11) | 244 | $M = 15.6$ ($SD = .49$) | Revised Test Anxiety Scale Children's Negative Cognitive Error Questionnaire Grade on GCSE examinations | Higher test anxiety was related to academic cognitive distortions Students with cognitive distortions also obtained a lower grade in GCSE examinations |
| Putwain et al. [87] | English high school students (grades 10 and 11) | 298 | $M = 14.9$ ($SD = .70$) | Revised Test Anxiety Questionnaire Coping with Pre-exam Anxiety and Uncertainty Academic Buoyancy Scale | Students with greater academic buoyancy reported lower test anxiety Highly test anxious students tended to use more social support and avoidance coping strategies |
| Putwain et al. [10] | English secondary school students (grade 11) | 705 | $M = 15.03$ ($SD = 0.58$) | Revised Test Anxiety Scale Academic Buoyancy Scale Scores on GSCE examinations | Girls had higher test anxiety and academic buoyancy than boys No gender differences in exam performance Academic buoyancy was a protective factor against test anxiety and enabled better exam performance |

**Table 1** (continued)

| Authors | Sample | Sample size | Sample age | Measures used | Summary of findings for senior students |
|---|---|---|---|---|---|
| Putwain et al. [81] | English secondary school students (grade 11) | 325 | $M = 15.3$ ($SD = 0.61$) | Revised Test Anxiety Scale<br>Academic Buoyancy Scale<br>Coping with Pre-exam Anxiety and Uncertainty Scale<br>GCSE Scores | Higher test anxiety was associated with poorer exam performance<br>Students with lower academic buoyancy were more likely to be test anxious and then perform poorly on their exams |
| Rahafar et al. [60] | Iranian high school students (final year) | 158 | $M = 17.5$ ($SD = 0.51$) | Grade Point Average<br>Reduced morningness-eveningness questionnaire<br>NEO five-factor inventory—Conscientiousness subscale<br>Test Anxiety Inventory | Students with higher levels of conscientiousness had lower test anxiety and higher GPAs, and were more likely to be "morning-type" people<br>Females had higher test anxiety than males |
| Riekie et al. [102] | Australian students in year 11 | 618 | Range 16–17 years ($M$ and $SD$ unreported) | Interviews<br>Index of Community Socio-Educational Advantage<br>What is happening in this school questionnaire<br>Wellbeing, resilience, and moral identity questionnaire<br>WHO-Five Wellbeing Index<br>Resilience scale (adapted)<br>Moral Identity Scale | If students felt supported by teachers and their peers and valued at the school, they had a greater sense of resilience<br>School connectedness had a direct relationship on student wellbeing<br>School connectedness had the most significant impact on student resilience |
| Ringeisen and Buchwald [61] | German high school students in their final year | 82 | Range 17–20 years ($M = 18.06$, $SD = 0.81$) | German test anxiety inventory<br>Negative/positive state emotion<br>T1 (3 weeks before final exam), T2 (three weeks after exam) | Test anxiety was strongly related to state threat emotions before the exam but not after |
| Robinson et al. [9] | Australian high school students (grade 12) | 195 | Range 16 – 19 years ($M = 17.74$, $SD = 0.44$) | Adolescent Resilience Questionnaire<br>Subjective Stress<br>Depression Anxiety Stress Scales-21<br>Measure of Sleep | 24% boys and 36% girls reported severe or very severe symptoms of depression, anxiety, and stress (more than twice that of the normative sample)<br>Girls had greater anxiety than males<br>Many students had poor sleep<br>Resilience and freedom from negative cognitions were protective factors |

**Table 1** (continued)

| Authors | Sample | Sample size | Sample age | Measures used | Summary of findings for senior students |
|---------|--------|-------------|------------|---------------|------------------------------------------|
| Sarason [71] | American high school students (grades 11 and 12) | 460 | Unreported | Test Anxiety Scale (TAS) Need for Achievement Scale School and College Ability Test | Higher test anxiety was associated with lower academic performance, and this relationship was stronger for females |
| Sari et al. [62] | Turkish high school students (preparing for university entrance exams) | 724 | Range 16–19 years (*M* and *SD* unreported) | Sociodemographic questionnaire Rosenberg Self-Esteem Scale Revised Test Anxiety Scale | Females had higher test anxiety than males Students with higher self-esteem reported lower levels of test anxiety |
| Schmidt et al. [76] | Italian students in their final year of high school | 610 | Range 18–23 years (*M* = 18.7, *SD* = 0.90) | Appraisals of high school exit exam (18 items developed by authors) Intensity of emotions (18 items developed by authors) Emotion regulation strategies (18 items adapted from existing questionnaires) | Three weeks before exams the strongest emotions were anxiety, fear, hope Feeling anxious/fearful was positively correlated with frustrated/powerless Feeling anxious/fearful or frustrated/powerless was associated with evaluating the final exam as important and ability to cope as low Students who reported higher anxiety/fear reported a greater tendency to focus on the exam and to use drugs Students who reported more positive emotions used more reappraisal and problem-focused coping strategies |
| Segool et al. [70] | USA students in year 11 (required to take a standardised high school exam) | 1248 | Unreported | Survey questions (developed by authors) about self-efficacy, special education status, academic achievement, minority status, socio-economic status, gender, school climate, career goals, and test importance Friedben test anxiety scale | Females reported higher test anxiety than males Students with lower self-efficacy reported higher test anxiety Students who perceived higher teacher and peer anxiety reported higher test anxiety Students with lower academic achievement had higher test anxiety |

**Table 1** (continued)

| Authors | Sample | Sample size | Sample age | Measures used | Summary of findings for senior students |
|---|---|---|---|---|---|
| Smith and Sinclair [22] | Australian high school students (grades 11, 12) | 130 | Unreported | Depression Anxiety Stress Scales-21 Patterns of Adaptive Learning Scale | >40% of Year 12 students and 25% of Year 11 students had symptoms of depression, anxiety and/or stress above the normal range Girls had greater anxiety, depression, and stress symptoms than males Boys with a performance-avoidance goal orientation were more anxious, depressed, and stressed High self-efficacy was protective against stress, anxiety, and depression in girls |
| Smith et al. [32] | Australian high school students (grade 12) | 63 | Unreported | Patterns of Adaptive Learning Survey Depression Anxiety Stress Scales | As final exams drew nearer, students became significantly more anxious and depressed, used more self-handicapping and performance-avoidance strategies, and their self-efficacy decreased Girls had higher anxiety and stress than boys. Boys used more performance-avoidance and self-handicapping strategies than girls Students with a performance-approach goal combined with limited use of self-handicapping strategies had more stress |
| Smyth and Banks [77] | Irish students in the Junior Certificate exam year and Leaving Certificate exam year | 12 case-study schools | Unreported | Interviews (k=47 lower secondary, k=53 upper secondary) Questionnaire survey (n=897 lower secondary, n=748 upper secondary) | Students preparing for final Leaving Certificate reported "particularly high levels of pressure and stress" Students preparing for the Junior and Leaving Certificate both reported they "wanted teachers who were patient and willing to explain things clearly" |

**Table 1** (continued)

| Authors | Sample | Sample size | Sample age | Measures used | Summary of findings for senior students |
|---------|--------|-------------|------------|---------------|------------------------------------------|
| Sud and Sujata [80] | Indian high school students (grade 11) | 200 | Unreported | Self-Handicapping Questionnaire<br>Test Anxiety Inventory-Hindi<br>Study Habit Inventory<br>Academic performance (grades) | Higher test anxiety was associated with greater worry, emotionality, self-handicapping, and with poorer study habits<br>The cognitive component of test anxiety (worry) was negatively related to academic performance |
| Ünal-Karagüven [55] | Turkish senior high school students | 336 | Range 17–20 years ($M = 18$) | Demographics questionnaire<br>Academic Motivation Scale<br>Test Anxiety Inventory<br>Communal Mastery Scale | Students with higher perceived academic achievement had lower test anxiety<br>Test anxiety was significantly negatively correlated with communal mastery (believing that one can achieve things with the help of others), having siblings, and perceived academic achievement |
| von der Embse and Witmer [51] | American high school students (grade 11) | 1134 | Unreported | Friedben Test Anxiety Scale<br>Demographics<br>Exam performance | Higher test anxiety was associated with poorer exam performance |
| Wilkinson-Lee et al. [26] | American school students (grades 6 to 12) | 4198 | Unreported | Emotional distress (Modified Depression Scale CDC Compendium)<br>Family obligations (CSAP Core Measures)<br>School connectedness (CDC Classroom Climate Scale)<br>Academic achievement (grades) | Students in grades 11 and 12 were significantly more distressed than students in earlier grades (6, 7, 8 and 9)<br>Students in higher grades had lower school connectedness |
| Yeni Palabiyik [33] | Turkish students in their final three years (Years 10, 11, and 12) | 62 | Unreported | Maslach Burnout Inventory-student survey<br>Quick Placement Test | For 12th grade students, emotional exhaustion was significantly higher than overall burnout<br>Non-significant increase in burnout levels from grade 10 to 12<br>Male 12th grade students had the highest level of burnout |

**Table 1** (continued)

| Authors | Sample | Sample size | Sample age | Measures used | Summary of findings for senior students |
| --- | --- | --- | --- | --- | --- |
| Yildirim et al. [47] | Turkish students preparing for university entrance examinations | 984 | Range 17–21 years ($M = 18.4$, $SD = 2.3$) | Beck Depression Inventory (BDI) Personal information questionnaire (demographics) | Depressive symptoms were significantly greater in females than males. Students with lower academic GPA's had higher levels of depressive symptoms |

in the cohort studies. In consolidating the findings across studies, more emphasis is placed on the findings from the higher quality studies.

## Outcomes

### Distress Increases Over the Senior School Period

**Cohort Studies** Comparisons between student cohorts across different grades generally found that the final year of high school was associated with more distress than the penultimate year [21, 22], and the penultimate year was associated with more distress than the earlier years [23–26] suggesting that distress is likely to increase through the senior years. Although the majority of studies found increased distress in later school years, not all did [e.g. 27, 28], and this may relate to differences in the timing of assessments or perceived stakes of the assessments. For example Locker and Cropley [28] assessed UK students in year 11 and year 9 twice, both at the same time prior to major exams and found no differences in distress. Therefore students might find all examination periods equally distressing (regardless of school year). However, it is important to note likely cohort effects between groups studied, as well as differences in the timing and type of distress measurement particularly in terms of the proximity and types of upcoming examinations. Longitudinal studies with repeated measurement in the same sample are needed to understand changes in distress over time.

**Longitudinal Studies** Five studies sampled distress in the same students throughout the final year, with most finding increases in distress as major examinations approached [29–33], and decreased distress after the examination period [30]. Einstein, Lovibond and Gaston [29] measured distress using the Depression, Anxiety and Stress Scales [DASS; 34] in Australian year 12 students on two occasions prior to upcoming major examinations; 10 weeks prior and again 10 days prior to the same exam period. They found mean student distress increased significantly from the first testing to the second testing from: moderate to severe anxiety, from severe to extremely severe stress, and remained in the severe range (but significantly increased) from first to second testing for depression. Similarly, Smith, Sinclair and Chapman [32] administered the DASS to 63 Australian students in February (term 1 year 12) in and again in August (term 3) just before the major trial examinations. Students' group means for DASS measured stress, anxiety and depression increased significantly overall between the two testing occasions from mild to moderate depression, from mild to moderate anxiety; however, remained at a mild level for stress across both occasions.

**Table 2** Quality ratings of articles included in the review

| Quantitative studies | Focused issue | Adequate sample | Unlikely bias | Appropriate design | Adequate analysis/interpretation |
|---|---|---|---|---|---|
| Akca [23] | Yes | Yes | Yes | No | Unclear |
| Akcoltekin [95] | Yes | Unclear | Unclear | Unclear | Unclear |
| Astill et al. [96] | Yes | Yes | Unclear | Yes | Yes |
| Aysan et al. [66] | Yes | Yes | Yes | Yes | Yes |
| Byrne [53] | Yes | Yes | Yes | Yes | Yes |
| Chin et al. [69] | Yes | Yes | Yes | Yes | Yes |
| Christensen [65] | Unclear | Unclear | Unclear | Unclear | Unclear |
| Chukwuorji andNwonyi [54] | Yes | Yes | Yes | Yes | Yes |
| Cunha and Paiva [27] | No | Yes | Yes | Unclear | Unclear |
| Daly et al. [115] | Unclear | No | Yes | No | No |
| Einstein et al. [29] | Yes | Yes | Yes | Yes | Yes |
| Erzen andOdaci [56] | Yes | Yes | Yes | Yes | Yes |
| Flett et al. [85] | Yes | Yes | Yes | Yes | Yes |
| Guner-Kucukkaya and Isik [24] | Yes | Yes | No | No | No |
| Hodge et al. [21] | Yes | Yes | Yes | Yes | Yes |
| Karatas et al. [57] | Yes | Yes | Yes | No | No |
| Kouzma and Kennedy [74] | No | Yes | No | No | No |
| Kouzma and Kennedy [94] | Yes | Yes | Unclear | No | No |
| Lay et al. [30] | No | Yes | Yes | Yes | Unclear |
| Lee and Larson [48] | Yes | Yes | Yes | Yes | Yes |
| Leonard et al. [6][a] | Yes | Yes | Unclear | Yes | Yes |
| Lin and Yusoff [43] | Yes | Yes | Yes | Yes | Yes |
| Lushington et al. [59] | Yes | Yes | Unclear | Unclear | Yes |
| Manley and Rosemier [64] | Unclear | Yes | Yes | Yes | Unclear |
| McCann and Meen [72] | Yes | Unclear | Yes | No | No |
| McGraw et al. [3] | Yes | Yes | Yes | Yes | Yes |
| Moulds [25] | Yes | Yes | Unclear | Yes | Yes |
| Peluso et al. [31] | Yes | Yes | Yes | Yes | Yes |
| Putwain [49] | Yes | Yes | Yes | No | No |
| Putwain [50] | Yes | Yes | Yes | Unclear | Yes |
| Putwain [52] | Yes | Yes | Yes | Yes | Yes |
| Putwain and Aveyard [82] | Yes | Yes | Yes | Yes | Yes |
| Putwain and Daly [5] | Yes | Yes | Yes | Yes | Yes |
| Putwain and Symes [89] | Yes | Yes | Yes | Yes | Yes |
| Putwain and Symes [103] | Yes | Yes | Yes | Yes | Yes |
| Putwain et al. [10] | Yes | Yes | Yes | Yes | Yes |
| Putwain et al. [79] | Yes | Yes | Yes | Yes | Yes |
| Putwain et al. [81] | Yes | Yes | Yes | Yes | Yes |
| Putwain et al. [87] | Yes | Yes | Yes | Yes | Yes |
| Rahafar et al. [60] | No | Yes | Yes | No | No |
| Riekie et al. [102] | Yes | Yes | Unclear | Unclear | No |
| Ringeisen and Buchwald [61] | Yes | Yes | Unclear | Unclear | Unclear |
| Robinson et al. [9] | Yes | Yes | Unclear | Yes | Yes |
| Sarason [71] | Yes | Unclear | Unclear | No | No |
| Sari et al. [62] | Yes | Yes | Yes | Yes | Yes |
| Schmidt et al. [76] | Unclear | Unclear | No | Unclear | No |
| Segool et al. [70] | No | Yes | No | Unclear | No |
| Smith and Sinclair [22] | Yes | Yes | Yes | Yes | Yes |
| Smith et al. [32] | Yes | Yes | Yes | Yes | Yes |
| Smyth and Banks [77][a] | Unclear | Yes | Unclear | Unclear | Unclear |

**Table 2** (continued)

| Quantitative studies | Focused issue | Adequate sample | Unlikely bias | Appropriate design | Adequate analysis/interpretation |
| --- | --- | --- | --- | --- | --- |
| Sud and Sujata [80] | Yes | Unclear | Yes | Yes | Yes |
| Ünal-Karagüven [55] | Unclear | Yes | Yes | Unclear | Unclear |
| von der Embse and Witmer [51] | Yes | Yes | Yes | Yes | Yes |
| Wilkinson-Lee et al. [26] | Yes | Yes | Unclear | Yes | Yes |
| Yeni Palabiyik [33] | Yes | Yes | Yes | Yes | Yes |
| Yildirim et al. [47] | Yes | Yes | Unclear | Yes | Unclear |
| Qualitative studies | Clear aims | Adequate sample | Appropriate method | Unlikely confounds | Adequate analysis/interpretation |
| Çirak [73] | Yes | Yes | Yes | Unclear | Yes |
| Leonard et al. [6][a] | Yes | Yes | Yes | Yes | Yes |
| Putwain [8] | Unclear | Yes | Yes | Unclear | Yes |
| Putwain [75] | Yes | Yes | Yes | Yes | Yes |
| Smyth and Banks [77][a] | Unclear | Yes | Yes | Unclear | Yes |

[a]These studies had both quantitative and qualitative results. Yes=met criterion, No=didn't meet criterion, Unclear=unclear if criterion was met

Similar findings were found by Peluso et al. [31] in 154 Brazilian students using the Positive and Negative Affect Scale [PANAS; 35] administered three times during the last year of high school. They found negative affect scores increased over time, with no significant change in positive affect scores. Lay et al. [30] also found that mean state anxiety scores significantly increased from seven days prior, to one day prior to exams, and then decreased five days after the exam period in final year students in Canada. In contrast, Locker and Cropley [28] found no significant increases in distress in a sample of students in four UK high schools from six to eight week prior to exams, to one week prior to exams on the PANAS [35], Children's Depression Inventory [CDI; 36], Revised Manifest Anxiety Scale [RCMAS; 37], or Rosenberg Self-Esteem Scale [38]. Although it is important to note that there was 21% attrition between the two testing periods and this may have led to missing data at the higher distress levels. In general studies have shown that stress is heightened in the senior years compared to lower years and increases in the lead up to the major exam period.

### Severity of Distress

Across a wide range of measures and countries, most studies reported that students had high levels of distress with stronger similarities across samples when the same measure was used in the same country (see Table 1). Determining how "high" the distress was across the samples is difficult to ascertain as studies differed in the cut-offs used to define high distress, with many applying cut-offs from adult normative samples. For example interpretation of scores on the TAI were based on normative data from college students collected 40 years ago, and recent research suggests these cut-offs are out of date for college students [39]. Similarly, interpretation of scores on the DASS was based on normative data developed in adult samples, and despite its wide spread use with adolescents, there are no adolescent norms available. Further, although the three factor structure of the DASS (depression, anxiety, stress) has been generally supported in adolescent samples with minor modifications [40, 41], it has not consistently been supported [42], and so caution is needed in interpreting the results. It is also difficult to determine if the distress levels reported across studies related to distress prior to an examination or general distress across the senior school period. Studies differed in the timing of distress measurements to major examinations and timing was often was not reported.

Due to the range of measures used, comparisons between studies are difficult; however, the TAI was used in nine studies and the DASS in five studies enabling some comparisons across studies to be made. Across the nine studies that used the TAI (most from the UK), distress was consistently reported to be high in final year students [e.g. 5]; however, different authors used different definitions for "high" test anxiety. In the largest study, Putwain and Daly [5] administered the TAI to 2435 students from 11 UK secondary schools in the final two years of schooling (years 10 and 11; with a small sample in year 9 who were being accelerated) in the lead up to the final exam period. High test anxiety was defined as scoring in the top 1/3rd of the score range, that is students who reported experiencing anxiety somewhere from "often" to "almost always". Using this definition, they found 16.4% reported high test anxiety, with females reporting significantly higher test anxiety than males (22.5% vs 10.3%). It is not clear whether the 16% of students reporting high levels of test anxiety is significantly more than in other years. Similar findings were reported by the other studies using the TAI.

Five studies (all Australian) reported on student levels of depression, anxiety and stress using the DASS [34] in

either its full (42 item) or shortened (21 item) form [3, 9, 22, 29, 32]. In adult samples, scores can be interpreted as normal, mild, moderate, severe or extremely severe, with the severe and extremely severe categories suggestive of clinical levels of distress [34], although it is not known whether these cut-offs are applicable to adolescent samples. Robinson, Alexander, and Gradisar [9] sampled 195 final year (year 12) students in South Australia one month prior to the exams and found that male and female students (respectively) reported levels in the likely clinical range (severe or extremely severe on the DASS-21) for: depression (15%, 22%), anxiety (11.7%, 29.9%) and stress (18.3%, 22.3%). This is similar to the findings by McGraw, Moore, Fuller, and Bates [3] who surveyed 941 final year students (year 12) in term 3 in Victoria Australia and found the proportion of students who reported distress in the likely clinical range (severe or extremely severe on DASS-21) for: depression was 12.1%, anxiety (20.9%), and stress (11.3%). Smith and Sinclair [22] also measured DASS scores in term 3 for year 11 and year 12 students in New South Wales, Australia, and found the proportion of students reporting severe to extremely severe levels in the two cohorts (Year 11, Year 12) being: 12.5% vs 24% for stress, 11% vs 19% for anxiety and 13% vs 24% for depression with clear increased distress in the final year students.

Averaging across the five studies, final year (year 12) students' mean level of distress likely to be in the clinical range (severe or extremely severe) was for stress 17.77% (means ranged from 11.39 to 21.07%), for anxiety 21.03% (means ranged from 17.90 to 24.30%), and for depression 18.12% (means ranged from 12.10 to 22.42%). Averaging the mean score across the scales, 19% of students reported distress in the severe to extremely severe range (as per adult norms). This is similar to the average of 16% with reported high test anxiety across 11 UK schools in the Putwain and Daly [5] study reported above. So about 1 in 6 final year students is likely to have very high levels of distress which might be of clinical concern.

The other studies examined distress severity using a range of other self-report symptom scales and generally reported high proportions of distress in the student samples (in most cases as indicated against adult norms). Two studies [21, 43] used the Global Health Questionnaire [GHQ: 44] in its full and short (12 item) form. Hodge, McCormick and Elliott [21] applied a conservative clinical cut-off ($\geq 8$) on the GHQ 30 item version to Year 11 and Year 12 students in New South Wales Australia and found 42.4% Year 11 and 56.7% Year 12 students reported distress in the clinical range (based on adult norms). Similarly, Lin and Yusoff [43] found 48% of senior students in Melaka scored in the clinical range on the GHQ 12 item (using a cut off of $\geq 4$). One study examined depression using the Patient Health Questionnaire-9 [PHQ-9: 45] and found 26% of final year students in

North-East USA scored above the clinical cut off of 10 based on adult norms [6], and one study used the Beck Depression Inventory Revised [BDI-R: 46] and reported 45% of a Turkish sample were in the clinical range for depression (based on adult norms using a cut off of $> 16$) two months prior to their major examinations [47]. Only three studies used a scale developed for children, the Children's Depression Inventory [36], and the one study that reported scores in relation to clinical cut offs found that 36% of final year Korean students were above the cut-off for clinical depression, compared to 16% of American students [48]. Across these other measures the proportion of students experiencing very high distress ranged from 16 to 57% although the majority used normative cut-offs based on adult samples and so may not accurately reflect clinical distress.

## Factors Associated with Increased Distress

Across the studies there was evidence that demographic, individual, family and school factors were associated with increased distress in students in the final two years of school.

**Demographics** Demographic factors such as gender (discussed below), low socioeconomic status and studying in a second language were found to be associated with increased student distress in the final years of school although when reported the effect sizes for these effects were very small and difficult to differential as a range of demographic variables were often lumped together. Four studies [21, 27, 49, 50] found a significant difference in distress associated with lower socioeconomic status in Australia, United Kingdom and Portugal, but not Melaka [43], with only two studies reporting the unique variance of this effect as very small (R-squared change = 0.06–0.006 [21, 50]. Five studies (in Australian, UK and USA samples) found increased distress related to coming from a non-English speaking background [21, 29, 49–51], but not all [52], again with very small effects (R-square change = 0.002) [e.g. 21]. Three studies examined the impact of parental education and found no effect [9, 43, 53]; however, a protective effect was found for higher status of parental occupation in the UK [52] and Nigeria [54], but not in Melaka [43]. Other demographic effects were examined in only one or two studies making conclusions difficult. Birth order was not associated with distress [9]; however, having a sibling was associated with significantly reduced distress [55]. No effect was found for parental marital status [43] whilst one found an effect of parent divorce on males anxiety but not females [53], and increased anxiety in females with household stress but not males [53]. One study compared final year students living in Korea to students living in America and found that the Korean students had significantly higher depression [48].

**Individual Differences** The relationship between distress and individual factors were investigated. The strongest evidence related to female gender, anxiety proneness and freedom from negative thoughts with emerging evidence for: perfectionism, academic buoyancy, student motivation and coping, hours of study and sleep.

**Gender** Females reported significantly higher distress in the final years of high school than males across a wide range of distress measures and samples [3, 9, 13, 21, 22, 27, 28, 30, 52, 53, 56–65]. Overall, in the senior school samples females consistently had higher scores for anxiety symptoms than males [3, 22, 28, 53, 64, 65]. Similarly, females also had higher test anxiety scores across a range of senior school samples such as in the UK [5, 13, 50, 52], in Chinese students [58], American students [64, 65], Greek students [61], Iranian students [60], Portuguese students [27], Turkish students [56, 57, 62, 63, 66], but in one study male and female Nigerian students did not differ significantly on test anxiety [54]. Females had higher depression scores than males in some samples [22], but not in others [3, 28]. Females also had higher scores for DASS stress [3, 22]. These findings could relate to the higher emotionality of females and higher prevalence of anxiety (and depressive) disorders in adolescent female samples [67, 68], or gender differences in willingness to report emotional distress.

**Anxiety Proneness** It was consistently found that greater distress in the final years of school was associated with or predicted by higher *trait* anxiety suggesting anxious prone students are more likely to experience distress. For example, higher state trait anxiety was found to predict 58% of variance in distress (measured on the GHQ) in senior students over and above demographics, school type, coping and gender [21]. Similarly, negative affect was shown to predict higher test anxiety in senior school students in New Zealand [69]. Studies have also reported that high test anxiety, which is a measure of *trait* anxiety [11] and hence anxiety proneness is associated with increased distress, lower self-efficacy and self-esteem in final year students [54, 56, 70], and lower examination performance [10, 71, 72]. Therefore, anxiety proneness is likely to be a significant predictor of senior school distress.

**Negative Cognitions** Qualitative and quantitative studies across a number of different countries (Australia, Canada, Ireland, Italy, Turkey, Melaka, United Kingdom, United States of America) found heightened distress in the final years of school was strongly associated with negative cognitions, fear of failure, fear of examinations, homework concerns and fear of not getting into university [6, 8, 30, 43, 73–77]. The significance of negative cognitions was particularly highlighted in a study of 195 year 12 students in South Australia [9], in which 12 internal and external factors associated with resilience were examined. In females, freedom from negative cognitions was the largest predictor of resilience to depression, anxiety and stress, with family connectedness and confidence also being important. For males, freedom from negative cognitions, confidence, family, peer and school connectedness were significant predictors of resilience.

Negative cognitions in test anxiety have also been shown to be strongly associated with distress. Test anxiety has been conceptualised as having a cognitive component (e.g. worry about failure) and an affective-physiological component (e.g. somatic symptoms of anxiety) [78]. The cognitive component of test anxiety has been specifically found to be associated with test performance in a range of studies [10, 50, 51, 79, 80], with higher scores being predictive of poorer test performance on major exams in senior students from the UK, New Zealand, USA, India, and Turkey [10, 50, 57, 69, 80, 81]. In a large study, 705 UK students in the final year of school (Year 11) completed measures of test anxiety and academic buoyancy (see below) four months prior and again two months prior to the final exams [10]. The worry component of test anxiety at baseline was associated with lower exam performance four months later. Similar findings in a number of UK studies have shown negative cognitions mediate the relationship between test anxiety and examination performance [79, 82]. Therefore, heighted negative cognitions and worry about tests appears to be particularly associated with student distress as well as reduced examination performance.

**Perfectionism** Theoretically, perfectionism is conceptualised as having dimensions incorporating cognitions and behaviours associated with a need to do things perfectly [83, 84]. Hewitt and Flett [84] described perfectionism as being driven by personal desires for high standards for the self (self-oriented), for others (other-oriented), or a perception that others hold unrealistic standards for one's behaviour (socially-prescribed). Perfectionism can be adaptive (high standards without excessive negative self-evaluation) or maladaptive (high standards coupled with excessive negative self-evaluation) and maladaptive perfectionism has been associated with distress and psychopathology [83]. A small number of studies have examined the impact of perfectionism on student distress in the final years of high school, and have generally found that higher levels of perfectionism were associated with increased distress and test anxiety [63, 85], mirroring findings in university students [86]. In an Australian sample, Einstein et al. [29] found socially-prescribed perfectionism (perceived perfectionistic standards expected by others e.g. parents) was associated with increased distress, but self-oriented and other-oriented perfectionism were not. Therefore, there is some evidence

that perfectionistic standards which result in negative evaluation of self or *perceived* negative evaluation by others, is associated with increased distress in students. As discussed above, it is likely that the negative cognitions that drive maladaptive perfectionism are an important component in student distress, and more research is needed to examine this further.

**Coping** Students who reported using more avoidant or non-adaptive coping styles (wishful thinking, self-blame, suppression) had higher distress and test anxiety scores [21, 30, 43, 66, 76, 87], with adaptive coping (problem solving, task orientation, reappraisal) associated with lower distress [21, 76, 81, 87]. Further, Italian final year students who reported decreased beliefs about their ability to cope with upcoming examinations had the highest distress [76]. These findings mirror other research showing that maladaptive coping, particularly avoidance, is associated with increased distress and psychopathology generally [88].

**Motivation** Four studies looked at the impact of student motivation to approach or avoid performance tasks on distress severity in the final years of school. A performance-approach goal refers to the motivation to outperform peers, whereas a performance-avoidance goal refers to motivation to avoid demonstrating lack of ability. Smith and Sinclair [22] looked at the impact of performance-approach goal orientation, performance-avoidance goal orientation, as well as self-efficacy and self-handicapping coping strategies on levels of depression, anxiety or stress in year 11 and 12 students. They found higher performance-avoidance goal orientation was associated with higher depression and anxiety in year 11 males, and anxiety and stress in year 12 males, and depression in year 12 females. Similarly, Putwain and Symes [89] also found in 273 final year UK students that higher test anxiety was associated with more performance-avoidance and mastery-avoidance (avoidance of increasing competence). In a sample of Indian students in their penultimate year of high school, those who reported higher test anxiety also indicated poorer study habits and using self-handicapping coping strategies [80]. These findings are similar to the findings above related to greater distress being associated with using avoidance as a coping strategy, as well as negative beliefs about their ability and the consequence of poor performance.

**Academic Self-efficacy** In qualitative interviews students reported that stress in the senior years related specifically to how confident and competent they felt about specific subject matter [8], with higher confidence in their competence for exam and assessment tasks relating to lower distress. The relationship between higher academic confidence and lower distress was also found in quantitative studies; Higher

self-efficacy was associated with lower test anxiety scores in American [70], Australian [9], and Turkish senior school students [55], as well as higher self-esteem in Nigerian [54] and Turkish senior students [56] and lower depression levels in Canadian senior students [85]. However, test competence was not a significant predictor of unique variance in examination performance when tested in a model also containing test worry, academic buoyancy and perceived control, suggesting that it is test related worry that is most relevant [82].

**Academic Buoyancy** Academic buoyancy is defined as the capacity to withstand routine types of academic setbacks, challenges, and pressures experienced by students during their education such as dealing with competing deadlines, poor grades and examination pressure [90]. It has been shown to be comprised of higher self-efficacy, higher planning ability, greater beliefs about control, persistence and low anxiety [91], and therefore includes many of the elements discussed above. Given that, it is perhaps not surprising that academic buoyancy has been found in a number of studies to be associated with lower test anxiety and distress, greater enjoyment of school, class participation, self-esteem, and better examination performance [10, 81, 87, 90, 92, 93]. Although academic buoyancy was found to explain unique variance (5–10%) in test anxiety in senior school students over and above coping [87], when the role of academic buoyancy was considered in conjunction with other predictors of examination performance, only worry about tests (strongest predictor) and perceived control (smaller predictor) were significant predictors of unique variance, with academic buoyancy and test competence being non-significant [82]. Therefore, academic buoyancy is an important concept in understanding senior school distress; however, it is unclear what the relationship is of academic buoyancy to the other main predictors of senior school distress such as the absence of negative cognitions and anxiety proneness, and further studies are needed to understand the specific and unique contribution of academic buoyancy on student distress.

**Time Spent Studying** Four studies examined the relationship between the number of hours spent studying and student distress and found that more hours studying was associated with greater distress and negative mood [31, 48, 59, 94]. However, the causal relationship between distress and time spent studying is not clear. In an interesting cultural comparison, Lushington et al. [59] found the relationship between greater hours of study and greater distress was only evident in Caucasian-Australian senior students and not in Asian-Australian senior students, and that hours of study only related to stress levels and not depressed mood. Lee and Larson [48] found that increased time spent on homework was only related to increased depression in those students

(Korean and American) who experienced increased negative affect *during* homework. This suggests that students' attitudes or negative cognitions towards or during homework might be a mediating factor between hours of study and distress. Lee and Larson [48] also found that more time spent in active leisure was associated with reduced depression, suggesting that it might not be the amount the number of hours spent studying specifically, but the portion of hours studying compared to hours spent doing pleasant (mood enhancing) activities. Interestingly, a study with Turkish senior students found that poorer time management when completing school assignments was associated with increased anxiety [95]. More research is needed to understand the relationship between study time and distress, and to examine individual differences in study patterns, emotional wellbeing and academic performance.

**Sleep** Three studies examined the relationship between sleep and stress in final year students and found links between increased stress and poorer sleep. In a small sample (n = 24) in the Netherlands, stress experienced in the final examination period was found to be associated with significantly reduced total sleep time ($17.5 \pm 8.2$ min), sleep efficiency and increased wake bouts [96]. Similarly, in a large (n = 195) Australian sample final year students one month prior to their final exams reported high rates of inadequate sleep, with more distressed students reporting greater rates of daytime napping [9]. Also Lushington et al. [59] found that 20% of students (n = 398) had missed class in the previous month because they had overslept, and that increased daytime sleepiness was associated with increased stress and depressed mood. Across the studies, it is not clear whether sleep is a predictor of distress or a consequence of distress. Both are likely true as there is clear evidence that inadequate sleep is associated with increased anxiety and depressed mood [97–99], as well as anxiety and depression being associated with poorer quality sleep and fatigue [100, 101]. More research is needed to understand the link between distress and poor sleep in senior students, what role excessive study might play in the reduced hours of sleep, and whether it is chronic or acute sleep deprivation that is most significant.

**Family, Peer and School Factors** The evidence related to the impact of school type, family, peer and school connectedness, perceived pressure, and fear appeals are examined in relation to distress in senior students.

**Type of School** In general no significant differences were found in distress levels across different school types or boarding compared to day students [6, 62]. Two studies found significantly higher mean anxiety scores in single sex girls' schools compared to coeducational and single six

boys' schools [25, 28], and one also found single sex girls' schools had significantly greater negative affect scores [28]. This school type effect is likely to be accounted for by the findings that females scored higher on anxiety and depression measures, rather than the school type specifically. One Turkish study reported school based differences in test based anxiety [56]; however, how the school types differed was not clearly described and so it is difficult to draw conclusions. In general it appears that school based differences are minor, with the main differences related to single sex girls' schools having higher distress, which likely reflects the strong effect of female gender on distress, although further research is needed to understand if female gender coupled with an all-female school environment increases the distress.

**Family, Peer and School Connectedness** Student distress varied by how strongly connected students felt with their schools (sense of belonging to their school community), their peers (satisfaction with peer relationships) and with their family (satisfaction with care and support from family, family cohesion). All five studies found that a more positive relationship with school was associated with reduced distress in final year students [3, 9, 26, 63, 102]. Strong peer connectedness was also shown to be associated with reduced distress. For example, in a large study of 941 Year 12 Australian students in their final year of school, McGraw et al. [3] found after controlling for gender that connection with school, peers and family were associated with reduced depression (accounting for 42% of the variance), with the strongest predictor being connection with peers. Male gender, peer connectedness and family connectedness were all significant protective factors for anxiety and stress (explaining 21–22% of the variance respectively), with peer connectedness again being the strongest protective factor. Peer connectedness was also related to increased resilience in an Australian sample [102]. In Turkish senior students, perceived support from peers (and teachers) was associated with less test anxiety [63]. Robinson et al. [9] also found that peer, school and family connectedness were predictive of resilience to distress in males in the final year of school, while only family connectedness (and not peer or school connectedness) was protective of distress in female students. In an American sample, students in higher grades reported lower school connectedness and higher anxiety than younger students [26]. Therefore, a strong sense of connectedness with the school, family and peers is important for reduced distress in senior students.

**Fear Appeals and Perceived Pressure** Fear appeals refer to attempts by teachers (or parents) to motivate students by highlighting the consequences of failing or doing poorly [103]. The impact of fear appeals on students' levels of distress and on subsequent examination performance has

been mixed and differs depending on how students' interpret the fear appeals. For example, in a sample of 132 UK students in their final two years of schooling, fear appeals by teachers to year 10 students (penultimate year of high school) were found to be associated with increased worry and tension related to their major mathematics exam later in Year 11, but this was only true for students who *perceived* the fear appeals to be threatening [103]. For other students, perceived threat from fear appeals in year 10 was associated with increased fear of failure but also an increased motivation to improve their competence (mastery-approach), hence the fear appeals helped to increase their commitment to study. Similarly, in a sample of 273 final year UK students, Putwain and Symes [89] found that fear appeals by teachers that were perceived as threatened associated with a greater performance-avoidance approach, and resulted in poorer examination performance. Although research recently found that when fear appeals were used more frequently, the tendency to appraise them as threatening increased [104], with related research in university students suggesting that efficacy appeals (instead of fear appeals) resulted in reduced distress and increased examination performance [105]. More research is needed to understand the links between fear appeals, threat perception, and examination performance. The emerging research that efficacy appeals might produce better emotional outcome and test performance is particularly important.

Similarly, qualitative studies found students with perceived pressure from parents, teachers and peers reported higher distress [6, 8, 73, 75]. Çırak's [73] study in Turkish senior students identified that the pressure from parents related to a desire by students to not disappoint their parents who had often made significant sacrifices to give them an educational opportunity. As reported earlier, Einstein et al. [29] found that higher socially-prescribed perfectionism, which captured perceived pressure to achieve unrealistic goals determined by significant others, was a significant predictor of distress (depression and anxiety) in final year students prior to a set of major exams. Therefore the findings suggest that *perceived* pressure by teachers to do academically well is predictive of heightened distress in the final years of school and mediated the impact on student distress and examination performance.

## Discussion

This review aimed to understand the nature of, severity of, and correlates of distress in secondary students undergoing the final years of schooling. The global interest in this topic was demonstrated by studies represented student samples from 16 different countries, with the majority reporting high levels of distress in students. There was evidence that distress increased as examination periods approached, however, it is unclear whether the severity of distress experienced by these students is dissimilar to younger students approaching examinations that might be considered to be associated with lower academic stakes [4]. More research using longitudinal designs and carefully timed assessment of distress in examination and non-examination periods across grade levels is needed.

Given consistent reports that many students reported very high levels of distress, the question of whether distress experienced by students in their final years is *too much* is a topical one. This question is difficult to answer given the differences in measurement tools used and use of age appropriate normative cut-offs were generally absent. Examining the data from the two countries with the most research, using the TAI in the UK an average of 16% of students might be considered to have distress that was excessive, and using the DASS in the Australian data an average of 19% might be considered to have excessive distress. This equates to approximately one in six students. This rate of distress is very similar to the findings from two large Australian national surveys. In the Youth Mental Health Report [2] 21.2% of adolescents aged 15–19 years reported high levels of distress, and in the Australian National Survey of the Mental Health of Children and Adolescents [68] 19% of adolescents reported very high or high levels of distress. It is not clear if the distress captures in these national surveys predominately captures school based stress, or if the distress captured in the studies in this review capture distress that is different from normal. It is unclear what proportion of the one in six students with high levels of distress identified in this review had distress that was in the clinical range, and whether that was higher than expected. The recent Australian National Survey of the Mental Health of Children and Adolescents [68] found that 14.4% of 12–17 year olds met criteria for a mental disorder in the previous 12 months, and 7% met criteria for an anxiety disorder. Therefore it is likely that at least this proportion of students in the final years of school are likely to be clinically distressed. Although this distress might be transient, it is clear that some students are very distressed and would benefit from additional assistance to manage their distress. Establishing methods to identifying these students as soon as possible is an important direction for the future.

In addition, to the proximity of examinations, a number of other factors were found to be associated with increased distress in high school students in the final years. The most consistent effects related to individual differences such as female gender, anxiety proneness and freedom from negative cognitions. The higher prevalence of distress in females fits with gender based differences in emotionality and incidence rates of internalising mental disorders [67, 68]. Findings that greater anxiety proneness was associated with increased distress fits with longitudinal research that shows early child

anxiety predicts later adolescent anxiety [106, 107]. It also fits theoretically with the Diathesis-Stress models [108] that assert that the combination of a diathesis or predispositional vulnerability coupled with a sufficient stressor results in psychological disorder or other poor psychological outcomes. As such the heightened stress associated with major exams or increased academic demands when coupled with a predisposing vulnerability towards distress, results in heightened distress that may be of clinical severity. Therefore, anxiety proneness is likely to be a significant predictor of senior school distress, and early identification of anxiety proneness in early school years could be used to predict students likely to experience excessive distress prior to the start of the senior years and thus be targeted for interventions prior to the senior school years.

The finding that freedom from negative thinking was a significant protective factor aligns with the findings that the cognitive elements of test anxiety and worry were the strongest predictors of student distress. The presence of negative cognitions are theorised to play a prominent role in the development and maintenance of child and adolescent anxiety disorders [16, 17]. For example, anxious students are likely to have the tendency to misinterpret ambiguous information (e.g. average marks), overinflate the likelihood and consequences of perceived negative events (e.g. "I will fail", and "It will be a disaster if I fail"), and have poorer coping strategies for dealing with this heightened distress (e.g. avoidance, procrastination), exacerbating and maintaining distress. Furthermore, a number of studies demonstrated that students with greater worry about tests actually had poorer examination performance. This highlights the need to intervene with students who show high distress or report high levels of worry about tests early so that they are not disadvantaged educationally. Given the important role of negative cognitions in test anxiety, distress and subsequent examination performance, more attention needs to be paid to interventions that target negative cognitions particularly in the lead up to high stakes tests. There is some evidence that cognitive behavioural interventions are effective in reducing distress in senior years when delivered as prevention programs [109] or as targeted programs for those experiencing acute academic distress when delivered in school settings [110, 111], and perhaps even in single session universal interventions [112]. These cognitive behavioural interventions focus on teaching students how to manage negative cognitions, feelings of stress, and how to reduce avoidant behaviours, which are the key factors identified in this review as predictors of distress.

Given evidence for the impact of peer, family and school connectedness on student distress, future interventions might include strategies to bolster peer, school and family relationships. There was also emerging evidence for other significant predictors of distress including maladaptive perfectionism,

poor sleep and excessive time spent on homework, with academic self-efficacy, academic buoyancy and resilience being protective factors. Although more research is needed to understand the unique contribution of these additional predictors over and above gender, anxiety proneness and freedom from negative cognitions, and how these factors interact with each other.

Finally, there was also emerging evidence for the role of perceived pressure from parents and teachers (through fear appeals) on student distress, although fear appeals were associated with increased distress and poorer examination performance only in some students. It is likely that anxious prone students are likely to interpret fear appeals or pressure from parents and teachers to perform as threatening and subsequently experience greater distress, although more research is needed to examine this relationship. Further research might also look at the underlying factors associated with the use of fear appeals by teachers and parents. It is likely that teacher/parental concerns related to suboptimal student performance drives this effect. As academic performance metrics are being used more frequently in the United Kingdom, Australia and elsewhere in accountability practices to judge school and teacher effectiveness [113], there is also emerging evidence for increasingly high levels of stress experienced by teachers who feel pressured to help their students get excellent results [114], this might result in teacher behaviours (such as the use of fear appeals that exacerbate student distress and reduce academic performance). Future research might track teacher stress and use of fear appeals and other teacher behaviours longitudinally to see how it relates to student's distress in large studies. Strategies to reduce teacher distress might also prove a future target for interventions to relieve student distress.

Limitations of the study need to be considered. Firstly, the quality of the studies varied considerably with the majority being of lower quality. Secondly, studies varied in the measures used to measure distress as well as individual correlates of distress. Thirdly few studies had control or comparison groups and so it is difficult to determine the difference in distress and relationships with correlates as they compare to other age groups. Finally, the studies were generally cohort studies with only one measurement occasion such that most studies report on correlates of distress (and often grouping multiple factors together), such that individual contributions of factors or predictors of distress cannot be conclusively determined.

## Summary

This systematic review examined the nature of and factors associated with student distress in the final two years of secondary school. The findings indicated academic stress

during this period is a clear concern across a large number of countries with a significant number of students experiencing very high levels of distress. Research indicated distress was associated with individual differences in anxiety proneness, gender and freedom from negative cognitions, as well as connectedness to family, peer and school. Other factors also appear to be associated with increased distress, although more research is needed to understand their unique contributions. More methodologically rigorous research tracking distress over time is needed to better understand chronicity and severity of distress and moderating and mediating factors. Such information will assist endeavours to apply interventions preventatively or in a targeted fashion for at-risk students.

## Compliance with Ethical Standards

**Conflict of interest** The authors declare that they have no conflict of interest.

## References

1. Huan VS, See YL, Ang RP, Har CW (2008) The impact of adolescent concerns on their academic stress. Educ Rev 60(2):169–178
2. Ivancic L, Perrens B, Fildes J, Perry Y, Christensen H (2014) Youth mental health report. Mission Australia and Black Dog Institute, AU
3. McGraw K, Moore S, Fuller A, Bates G (2008) Family, peer and school connectedness in final year secondary school students. Aust Psychol 43(1):27–37
4. Dewald JF, Meijer AM, Oort FJ, Kerkhof GA, Bogels SM (2014) Adolescents' sleep in low-stress and high-stress (exam) times: a prospective quasi-experiment. Behav Sleep Med 12(6):493–506
5. Putwain D, Daly A (2014) Test anxiety prevalence and gender differences in a sample of English secondary school students. Educ Stud 40(5):554–570
6. Leonard NR, Gwadz MV, Ritchie A, Linick JL, Cleland CM, Elliott L, Grethel M (2015) A multi-method exploratory study of stress, coping, and substance use among high school youth in private schools. Front Psychol 6:1028–1044
7. Chamberlain S, Daly AL, Spalding V (2011) The fear factor: students' experiences of test anxiety when taking A-level examinations. Pastor Care Educ 29(3):193–205
8. Putwain D (2009) Assessment and examination stress in Key Stage 4. Br Educ Res J 35(3):391–411
9. Robinson JA, Alexander DJ, Gradisar MS (2009) Preparing for Year 12 examinations: predictors of psychological distress and sleep. Aust J Psychol 61(2):59–68
10. Putwain D, Daly A, Chamberlain S, Sadreddini S (2015) Academically buoyant students are less anxious about and perform better in high-stakes examinations. Brit J Educ Stud 85(3):247–263
11. Spielberger CD (1980) Preliminary professional manual for the Test Anxiety Inventory. Consulting Psychologists Press, Palo Alto
12. King NJ, Ollendick TH, Prins PJ (2000) Test-anxious children and adolescents: psychopathology, cognition, and psychophysiological reactivity. Behav Chang 17(3):134–142
13. Putwain D (2008) Deconstructing test anxiety. Emot Behav Difficult 13(2):141–155
14. Gross C, Hen R (2004) The developmental origins of anxiety. Nat Rev Neurosci 5(7):545–552
15. Weems CF (2008) Developmental trajectories of childhood anxiety: Identifying continuity and change in anxious emotion. Dev Rev 28(4):488–502
16. Rapee RM (2001) The development of generalized anxiety. In: Vasey MW, Dadds MR (eds) The developmental psychopathology of anxiety. Oxford University Press, New York
17. Spence SH, Rapee RM (2016) The etiology of social anxiety disorder: an evidence-based model. Behav Res Ther 86:50–67
18. Moher D, Liberati A, Tetzlaff J, Altman DG (2009) Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. Ann Intern Med 151(4):264–269
19. Critical Skills Appraisal Programme (2018) CASP Cohort Study Checklist [online]: https://casp-uk.net/casp-tools-checklists/
20. Critical Skills Appraisal Programme (2018) Qualitative Study Checklist [online]: https://casp-uk.net/casp-tools-checklists/
21. Hodge GM, McCormick J, Elliott R (1997) Examination-induced distress in a public examination at the completion of secondary schooling. Brit J Educ Psychol 67(2):185–197
22. Smith L, Sinclair KE (2000) Transforming the HSC: affective implications. Change 3(2):67–79
23. Akca F (2011) The relationship between test anxiety and learned helplessness. Soc Behav Pers 39(1):101–111
24. Guner-Kucukkaya P, Isik I (2010) Predictors of psychiatric symptom scores in a sample of Turkish high school students. Nurse Health Sci 12(4):429–436
25. Moulds JD (2003) Stress manifestation in high school students: an Australian sample. Psychol Schools 40(4):391–402
26. Wilkinson-Lee AM, Zhang Q, Nuno VL, Wilhelm MS (2011) Adolescent emotional distress: the role of family obligations and school connectedness. J Youth Adolesc 40(2):221–230
27. Cunha M, Paiva MJ (2012) Text anxiety in adolescents: the role of self-criticism and acceptance and mindfulness skills. Span J Psychol 15(2):533–543
28. Locker J, Cropley M (2004) Anxiety, depression and self-esteem in secondary school children. Sch Psychol Int 25(3):333–345
29. Einstein DA, Lovibond PF, Gaston JE (2000) Relationship between perfectionism and emotional symptoms in an adolescent sample. Aust J Psychol 52(2):89–93
30. Lay CH, Edwards JM, Parker JD, Endler NS (1989) An assessment of appraisal, anxiety, coping, and procrastination during an examination period. Eur J Person 3(3):195–208
31. Peluso MA, Savalli C, Curi M, Gorenstein C, Andrade LH (2010) Mood changes in the course of preparation for the Brazilian university admission exam—a longitudinal study. Rev Bras Psiquitr 32(1):30–36
32. Smith L, Sinclair KE, Chapman ES (2002) Students' goals, self-efficacy, self-handicapping, and negative affective responses: an Australian senior school student study. Contemp Educ Psychol 27(3):471–485
33. Yeni Palabiyik P (2014) A study of Turkish high school students' burnout and proficiency levels in relation to their sex. Novitas-ROYAL 8(2):169–177
34. Lovibond S, Lovibond P (1995) Manual for the depression anxiety stress scales. Psychology Foundation of Australia, Sydney
35. Watson D, Clark LA, Tellegen A (1988) Development and validation of brief measures of positive and negative affect: the PANAS scales. J Pers Soc Psychol 54(6):1063–1070
36. Kovacs M (1985) The children's depression inventory (CDI). Psychopharmacol Bull 21:995–998

37. Reynolds CR, Richmond BO (1978) What I think and feel: a revised measure of children's manifest anxiety. J Abnorm Child Psychol 6(2):271–280

38. Rosenberg M (1965) Society and the adolescent self-image. Princeton University Press, New Jersey

39. Szafranski DD, Barrera TL, Norton PJ (2012) Test anxiety inventory: 30 years later. Anxiety Stress Coping 25(6):667–677

40. Szabó M (2010) The short version of the Depression Anxiety Stress Scales (DASS-21): factor structure in a young adolescent sample. J Adolesc 33(1):1–8

41. Willemsen J, Markey S, Declercq F, Vanhuele S (2011) Negative emotionality in a large community sample of adolescents: the factor structure and measurement invariance of the short version of the depression anxiety stress scales (DASS-21). Stress Health 27(3):120–128

42. Patrick J, Dyck M, Bramston P (2010) Depression Anxiety Stress Scale: is it valid for children and adolescents? J Clin Psychol 66(9):996–1007

43. Lin HJ, Yusoff MS (2013) Psychological distress, sources of stress and coping strategy in high school students. Int Med J 20(6):672–676

44. Goldberg DP (1972) The detection of psychiatric illness by questionnaire. London University Press, London

45. Spitzer RL, Kroenke K, Williams JB, Group P (1999) Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. J Am Med Assoc 282(18):1737–1744

46. Beck AT, Rush AJ, Shaw BF, Emery G (1979) Cognitive therapy of depression. Guilford, New York

47. Yildirim I, Ergene T, Munir K (2007) High rates of depressive symptoms among senior high school students preparing for National University Entrance Examination in Turkey. IJSD 4(2):35–44

48. Lee M, Larson R (2000) The Korean "Examination Hell": long hours of studying, distress, and depression. J Youth Adolesc 29(2):249–271

49. Putwain D (2008) Do examinations stakes moderate the test anxiety–examination performance relationship? Educ Psychol 28(2):109–118

50. Putwain D (2008) Test anxiety and GCSE performance: the effect of gender and socio-economic background. EPIP 24(4):319–334

51. von der Embse NP, Witmer SE (2014) High-stakes accountability: student anxiety and large-scale testing. J Appl Sch Psychol 30(2):132–156

52. Putwain D (2007) Test anxiety in UK schoolchildren: prevalence and demographic patterns. Brit J Educ Psychol 77:579–593

53. Byrne B (2000) Relationships between anxiety, fear, self-esteem, and coping strategies in adolescence. J Adolesc 35(137):201–215

54. Chukwuorji JC, Nwonyi SK (2015) Test anxiety: contributions of gender, age, parent's occupation and self-esteem among secondary school students in Nigeria. J Psychol Afr 25(1):60–64

55. Ünal-Karagüven MH (2015) Demographic factors and communal mastery as predictors of academic motivation and test anxiety. J Educ Train Stud 3(3):1–12

56. Erzen E, Odacı H (2016) The effect of the attachment styles and self-efficacy of adolescents preparing for university entrance tests in Turkey on predicting test anxiety. Educ Psychol 36(10):1728–1741

57. Karatas H, Alci B, Aydin H (2013) Correlation among high school senior students' test anxiety, academic performance and points of University Entrance Exam. Educ Res Rev 8(13):919–926

58. Liu YY (2012) Students' perceptions of school climate and trait test anxiety. Psychol Rep 111(3):761–764

59. Lushington K, Wilson A, Biggs S, Dollman J, Martin J, Kennedy D (2015) Culture, extracurricular activity, sleep habits, and mental health: a comparison of senior high school Asian-Australian and Caucasian-Australian adolescents. Int J Ment Health 44(1–2):139–157

60. Rahafar A, Maghsudloo M, Farhangnia S, Vollmer C, Randler C (2016) The role of chronotype, gender, test anxiety, and conscientiousness in academic achievement of high school students. Chronobiol Int 33(1):1–9

61. Ringeisen T, Buchwald P (2010) Test anxiety and positive and negative emotional states during an examination. Special Issue Test Anxiety 14(4):431–447

62. Sari SA, Bilek G, Celik E (2018) Test anxiety and self-esteem in senior high school students: a cross-sectional study. Nord J Psychiatry 72(2):84–88

63. Yildirim I, Ergene T, Munir K (2007) Academic achievement, perfectionism and social support as predictors of test anxiety. Hacet U J Educ 34:287–296

64. Manley MJ, Rosemier RA (1972) Developmental trends in general and test anxiety among junior and senior high school students. J Genet Psychol 120(2):219–226

65. Christensen H (1979) Test anxiety and academic achievement in high school students. Percept Mot Ski 49(2):648

66. Aysan F, Thompson D, Hamarat E (2001) Test anxiety, coping strategies, and perceived health in a group of high school students: a Turkish sample. J Genet Psychol 162(4):402–411

67. Merikangas KR, He J, Burstein M, Swanson SA, Avenevoli S, Cui L et al (2010) Lifetime prevalence of mental disorders in US adolescents: results from the National Comorbidity Survey Replication-Adolescent Supplement (NCS-A). J Am Acad Child Adolesc Psychiatry 49(10):980–989

68. Lawrence D, Johnson S, Hafekost J, Boterhoven de Haan K, Sawyer M, Ainley J et al (2015) The mental health of children and adolescents: Report on the second Australian child and adolescent survey of mental health and wellbeing. Australian Government Department of Health, Canberra

69. Chin E, Williams MW, Taylor JE, Harvey ST (2017) The influence of negative affect on test anxiety and academic performance: an examination of the tripartite model of emotions. Learn Individ Differ 54:1–8

70. Segool NK, von der Embse NP, Mata AD, Gallant J (2014) Cognitive behavioral model of test anxiety in a high-stakes context: an exploratory study. School Ment Health 6(1):50–61

71. Sarason IG (1963) Test anxiety and intellectual performance. J Abnorm Soc Psychol 66(1):73–75

72. McCann SJ, Meen KS (1984) Anxiety, ability, and academic achievement. J Soc Psychol 124(2):257–258

73. Çırak Y (2016) University entrance exams from the perspective of senior high school students. J Educ Train Stud 4(9):177–185

74. Kouzma NM, Kennedy GA (2004) Self-reported sources of stress in senior high school students. Psychol Rep 94(1):314–316

75. Putwain D (2011) How is examination stress experienced by secondary students preparing for their General Certificate of Secondary Education examinations and how can it be explained? Int J Qual Stud Educ 24(6):717–731

76. Schmidt S, Tinti C, Levine LJ, Testa S (2010) Appraisals, emotions and emotion regulation: an integrative approach. Motiv Emot 34(1):63–72

77. Smyth E, Banks J (2012) High stakes testing and student perspectives on teaching and learning in the Republic of Ireland. Educ Assess Eval Acc 24(4):283–306

78. Liebert RM, Morris LW (1967) Cognitive and emotional components of test anxiety: a distinction and some initial data. Psychol Rep 20(3):975–978

79. Putwain D, Connors L, Symes W (2010) Do cognitive distortions mediate the test anxiety–examination performance relationship? Educ Psychol 30(1):11–26

80. Sud A, Sujata (2006) Academic performance in relation to self-handicapping, test anxiety and study habits of high school children. Psychol Stud 51(4):304–309

81. Putwain D, Daly A, Chamberlain S, Sadreddini S (2016) 'Sink or swim': buoyancy and coping in the cognitive test anxiety—academic performance relationship. Educ Psychol 36(10):1807–1825

82. Putwain D, Aveyard B (2018) Is perceived control a critical factor in understanding the negative relationship between cognitive test anxiety and examination performance? Sch Psychol Q 33(1):65–74

83. Frost RO, Marten P, Lahart C, Rosenblate R (1990) The dimensions of perfectionism. Cogn Ther Res 14(5):449–468

84. Hewitt PL, Flett GL (1991) Perfectionism in the self and social contexts: conceptualization, assessment, and association with psychopathology. J Pers Soc Psychol 60(3):456–470

85. Flett GL, Panico T, Hewitt PL (2011) Perfectionism, type A behavior, and self-efficacy in depression and health symptoms among adolescents. Curr Psychol 30(2):105–116

86. Eum K, Rice KG (2011) Test anxiety, perfectionism, goal orientation, and academic performance. Anxiety Stress Coping 24(2):167–178

87. Putwain D, Connors L, Symes W, Douglas-Osborn E (2012) Is academic buoyancy anything more than adaptive coping? Anxiety Stress Coping 25(3):349–358

88. Compas BE, Jaser SS, Bettis AH, Watson KH, Gruhn MA, Dunbar JP et al (2017) Coping, emotion regulation, and psychopathology in childhood and adolescence: a meta-analysis and narrative review. Psychol Bull 143(9):939–991

89. Putwain D, Symes W (2011) Perceived fear appeals and examination performance: facilitating or debilitating outcomes? Learn Individ Differ 21(2):227–232

90. Martin A, Marsh H (2009) Academic resilience and academic buoyancy: Multidimensional and hierarchical conceptual framing of causes, correlates and cognate constructs. Oxf Rev Educ 35(3):353–370

91. Martin A, Marsh H (2006) Academic resilience and its psychological and educational correlates: a construct validity approach. Psychol Schools 43(3):267–281

92. Putwain D, Daly A (2013) Do clusters of test anxiety and academic buoyancy differentially predict academic performance? Learn Individ Differ 27:157–162

93. Martin A, Colmar S, Davey L, Marsh H (2010) Longitudinal modelling of academic buoyancy and motivation: do the '5Cs' hold up over time? Br J Educ Psychol 80:473–496

94. Kouzma NM, Kennedy GA (2002) Homework, stress and mood disturbance in senior high school students. Psychol Rep 91(1):193–198

95. Akcoltekin A (2015) High school students' time management skills in relation to research anxiety. Educ Res Rev 10(16):2241–2249

96. Astill RG, Verhoeven D, Vijzelaar RL, Van Someren EJ (2013) Chronic stress undermines the compensatory sleep efficiency increase in response to sleep restriction in adolescents. J Sleep Res 22(4):373–379

97. Baum KT, Desai A, Field J, Miller LE, Rausch J, Beebe DW (2014) Sleep restriction worsens mood and emotion regulation in adolescents. J Child Psychol Psychiatry 55(2):180–190

98. Sarchiapone M, Mandelli L, Carli V, Losue M, Wasserman C, Hadlaczky G et al (2014) Hours of sleep in adolescents and its association with anxiety, emotional concerns, and suicidal ideation. Sleep Med 15(2):248–254

99. Short MA, Gradisar M, Lack LC, Wright HR, Dohnt H (2013) The sleep patterns and well-being of Australian adolescents. J Adolesc 36(1):103–110

100. Ramsawh HJ, Stein MB, Belik SL, Jacobi F, Sareen J (2009) Relationship of anxiety disorders, sleep quality, and functional impairment in a community sample. J Psychiatr Res 43(10):926–933

101. Tsuno N, Besset A, Ritchie K (2005) Sleep and depression. J Clin Psychiatry 66(10):1254–1269

102. Riekie H, Aldridge JM, Afari E (2017) The role of the school climate in high school students' mental health and identity formation: a South Australian study. Br Educ Res J 43(1):95–123

103. Putwain D, Symes W (2011) Teachers' use of fear appeals in the mathematics classroom: worrying or motivating students? Br J Educ Psychol 81(3):456–474

104. Symes W, Putwain D, Remedios R (2015) The enabling and protective role of academic buoyancy in the appraisal of fear appeals used prior to high stakes examinations. Sch Psychol Int 36(6):605–619

105. von der Embse NP, Schultz BK, Draughn JD (2015) Readying students to test: the influence of fear and efficacy appeals on anxiety and test performance. Sch Psychol Int 36(6):620–637

106. Ollendick TH, King NJ (1994) Diagnosis, assessment, and treatment of internalizing problems in children: the role of longitudinal data. J Consult Clin Psychol 62(5):918–927

107. Rapee RM (2014) Preschool environment and temperament as predictors of social and nonsocial anxiety disorders in middle adolescence. J Am Acad Child Adolesc Psychiatry 53(3):320–328

108. Zuckerman M (1999) Diathesis-stress models. In: Zuckerman M (ed) Vulnerability to psychopathology: a biosocial model. American Psychological Association, Washington, US

109. Werner-Seidler A, Perry Y, Calear AL, Newby JM, Christensen H (2017) School-based depression and anxiety prevention programs for young people: a systematic review and meta-analysis. Clin Psychol Rev 51:30–47

110. Lowe C, Wuthrich VM, Hudson JL (2020) Randomised controlled trial of Study Without Stress: a Cognitive Behavioural Therapy group program to reduce academic stress in students in the final year of high school. In preparation

111. Wuthrich VM, Lowe C (2015) Study without stress program. Department of Psychology, Macquarie University, Sydney, AU, Centre for Emotional Health

112. Varlow M, Wuthrich V, Murrihy R, Remond L, Tuquiri R, Van Kessel J et al (2009) Stress literacy in Australian adolescents. Youth Stud Aust 28(4):29–34

113. Saeki E, Pendergast L, Segool NK, von der Embse NP (2015) Potential psychosocial and instructional consequences of the common core state standards: implications for research and practice. Contemp Sch Psychol 19(2):89–97

114. von der Embse NP, Pendergast LL, Segool N, Saeki E, Ryan S (2016) The influence of test-based accountability policies on school climate and teacher stress across four states. Teach Teach Educ 59:492–502

115. Daly AL, Chamberlain S, Spalding V (2011) Test anxiety, heart rate and performance in A-level French speaking mock exams: an exploratory study. Educ Res 53(3):321–330