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The relationship between emotional problems and subsequent school attainment: A meta-analysis

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ABSTRACT

Longitudinal studies have provided mixed findings regarding the relationship between emotional problems and subsequent poor school attainment. A meta-analysis of 26 community-based studies of children and adolescents was performed. Results revealed a prospective association between emotional problems and poor school attainment. More consistent associations were found for depression than anxiety. Moderator analyses indicated that some of the heterogeneity between studies may be due to age and gender, with reduced heterogeneity particularly notable for school grades during early adolescence and for anxiety by gender. Findings suggest that early identification and provision of support for young people with emotional problems may be helpful for improving academic outcomes such as school attainment.

Anxiety and depression are two of the most common psychiatric disorders in childhood and adolescence (Costello, Egger, & Angold, 2005), with rates increasing across this period, particularly for depression (Costello, Copeland, & Angold, 2011). Emotional problems in childhood and adolescence show continuity with emotional problems in adult life (Rutter, Kim-Cohen, & Maughan, 2006) and are associated with impaired functioning in adulthood, such as impairment in work and parenting (Weissman et al., 1999). One important way in which emotional problems may lead to adverse social and economic outcomes in adult life is through poor school attainment. Poor school attainment, such as failing to complete school or achieving low school grades, deleteriously impacts adult life chances. Educational failure has been associated with lower income, unemployment, mortality, and poor health status (Mirowsky & Ross, 2003; U.S. Department of Education, 2005).

There has been a significant body of research documenting the relationship between psychopathology and school outcomes. Findings of associations between behavioural problems and subsequent school attainment have been consistent (e.g. Hinshaw, 1992; Mirowsky & Ross, 2003; Richards & Abbot, 2009). However, while emotional problems are associated with concurrently assessed school attainment (e.g. Puig Antich, 1985; Strauss, 1987) longitudinal research is inconsistent (e.g. Richards & Abbot, 2009). It is not yet clear whether emotional problems are associated with later poor school attainment.

This paper aimed to clarify whether associations between emotional problems and school attainment are found in longitudinal studies. Further, it aimed to investigate whether heterogeneity between studies could be explained by a number of routinely collected potential moderators: specifically, age, gender and duration of follow-up period.

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Potential moderators

Age

Across childhood, adolescence and adulthood emotional problems show different prevalence rates and may be associated with different risk factors (Cohen et al., 1993; Jaffee et al., 2002; Rice, 2010). The influence of emotional problems on school attainment may therefore also vary with age. Indeed, Obradovic, Burt, and Masten (2010) found that, controlling for social competence, emotional problems during childhood, but not during adolescence, predicted lower subsequent academic competence. Thus, inconsistent results from existing studies may be attributable to variations in sample age range.

Gender

Gender differences in the prevalence of emotional problems are well documented (Costello, Erkanli, & Angold, 2006; Green, 2005). Girls also outperform boys in school attainment from the elementary school years to adolescence (DCSF, 2008; Snyder & Dillow, 2012). Nevertheless, the extent to which associations between emotional problems and school outcomes differ for boys and girls is not clear. Needham (2009) found that depressive symptoms predicted failure to complete high school for girls but not boys, whereas Obradovic et al. (2010), controlling for externalising problems, found that internalising problems predicted lower school competence for boys but not girls. Thus, it is important to consider whether gender may moderate the association between emotional problems and school attainment.

Follow-up period

Given that emotional problems show cross-sectional associations with school attainment, yet longitudinal associations are unclear, the duration of follow-up is a potential moderator of the strength of longitudinal relationships. Studies of clinically-depressed groups indicate long lasting impairment in school attainment (Harrington, Fudge, Rutter, Pickles, & Hill, 1990), though that this may apply specifically to depression, rather than anxiety (Last, Hansen, & Franco, 1997). In contrast, in a community sample, Masten et al. (2005) failed to find a longitudinal association between internalising problems and subsequent academic attainment. They suggested that emotional problems may influence academic achievement only within short follow-up periods (less than 3 years) with the implication that associations would not be found across longer follow-up periods. Indeed, given that emotional problems tend to be episodic, the influence on academic attainment may be short-term.

Measurement

The way in which emotional problems are conceptualised may also influence the associated relationship with school attainment. Some studies have examined 'internalising problems', usually defined as a combination of depression and anxiety, while others have examined associations separately for depression and anxiety. There are two main issues with investigating associations with the broad category of internalising problems. First, the definition of internalising problems differs across studies. Some studies use measures which include somatic problems, such as the Child Behaviour Checklist (Achenbach, 1991) while others combine specific measures of depression and anxiety (e.g. Janosz et al., 2008). Second, depression and anxiety may have different relationships with subsequent school attainment.

Where studies find an association between depressive symptoms and subsequent school attainment, the relationship tends to be a negative one, with higher levels of depressive symptoms associated with lower school attainment (e.g. Needham, 2009). In contrast, for anxiety, both positive and negative associations have been found. One study of anxiety found that groups of pupils with consistently low or high levels of anxiety had higher grade point averages (GPAs) than non-anxious pupils (Morin, 2011). However, others have found associations between anxiety and lower GPA (e.g. Ansary, McMahon, & Luthar, 2012). Indeed, measured dimensionally, some have suggested that anxiety can be part of an adaptive response to change which has some positive functions such as increasing motivation (e.g. Eysenck, 1982). Null findings between internalising problems and school attainment may therefore mask specific associations for depression and anxiety. In this paper, associations with school attainment were investigated separately for depression, anxiety and internalising problems.

Studies examining the influence of emotional problems on school functioning have included a wide range of outcome variables, which may also influence reported associations. Some measures utilise a range of sources, such as academic competence, which can include self-, parent- and teacher-reports, as well as school grades (e.g. Obradovic et al., 2010). Others, such as school burnout (e.g. Salmela-Aro, Savolainen, & Holopainen, 2009) are based on self-reports and are likely to be affected by shared method variance when emotional problems are assessed in the same way. For example, academic ability is under-estimated by children with current depressive symptoms compared to teachers and peers (Cole, Martin, Peeke, Seroczynski, & Fier, 1999). This paper focussed on the more objective measures of school grades and school failure (as assessed by failure to complete compulsory education), to avoid problems associated with shared method variance.

The present study

Six meta-analyses of studies investigating the longitudinal association between emotional problems and subsequent school attainment were performed. These analyses assessed the associations between: (1a) depression and school failure, (1b) internalising problems and school failure, (1c) anxiety and school failure, (2a) depression and school grades, (2b) internalising problems and school grades, and (2c) anxiety and school grades.

Method

Literature search procedure

Two search strategies were used to identify published studies examining the longitudinal association between emotional problems and school attainment written in English. The search was limited to published studies, as this provides a level of quality control. First, systematic searches were conducted using PubMed and ERIC. All combinations of the key words, found in any field, in the following groups were used: (a) emotional problems, internalising/internalizing, depression/depressive, (b) childhood/adolescence, (c) education, school/scholastic, functioning/functional. Weekly updates were also checked (concluding October 2012). Searches were repeated in PsycInfo, using the same search terms, with key words searched for in the fields: abstract, heading word, key concepts, original title, table of contents, tests & measures, and title[1]. Third, manual searches of reference lists from studies, review articles and book chapters identified through the above methods were carried out.

Fig. 1 illustrates the search and exclusion process. Studies were selected where the predictor variable was a measure of depression, internalising problems or anxiety and the outcome variable was either school grades or failing to complete compulsory education. So as to best reflect performance in school, rather than intelligence, general ability test scores were not included. Five additional criteria were set. First, participants were 8–18 years at start of study, so as to include school-age children and adolescents and because cognitive symptoms of depression are thought to be unlikely prior to 8 years of age (Kovacs & Devlin, 1998). Second, the study had to be longitudinal and prospective. This was to minimise the likelihood of reverse causation (school attainment predicting later emotional problems). Third, the sample had to be community-based (rather than clinical), allowing greater generalisability. Due to possible variation in the operationalisation of emotional problems in community samples, diagnostic versus dimensional/symptom measurement of emotional problem was investigated as a potential moderator. Fourth, no intervention/treatment occurred as part of the study on the included sample. This was to ensure that the measured relationship was the natural association, and not one influenced by the study. Fifth, data on the association between emotional problems and school attainment were presented.

Where two studies were based on the same sample, measuring the same association, only one study was included in the meta-analysis. In these instances, the study that included both genders, had a longer follow-up period, and presented greater detail was included. Four additional studies were excluded as they measured maths or test anxiety only and were therefore not comparable to other included studies.

The study characteristics coded were: school outcome (school failure, school grades); emotional problem (anxiety, depression, internalising problems); number of participants; country; gender ratio; age range at study commencement; mean follow-up period; measure of emotional problems. School outcome, emotional problem, age and follow-up period were independently coded by the first and last authors with discrepancies discussed until agreement was met (initial agreement was 92%). Following the identification of studies it was noted that the majority were carried out in the USA and therefore country of study (USA versus other) was added post-hoc as a potential moderator.

Analysis

Pearson's product–moment correlation coefficient (r) was used as the common effect size. Due to the variability in study characteristics, a random effects design was used. Individual effect sizes were transformed to Fisher's Z_r before combining. Where studies did not report r, and authors did not respond to requests to provide this ($N = 2$) or data could not be provided ($N = 2$), effect sizes were calculated based on available data (subgroup correlations; contingency tables; beta value). Where only beta coefficients were available ($N = 1$) these were used, as recommended by Peterson and Brown (2005). Corrections for dichotomisation of emotional problems were applied through the Hunter and Schmidt (1990) formula, using available information. Where effect sizes were only available for subgroups (e.g. males and females, $N = 2$) or where multiple associations were measured (physiological anxiety and social anxiety, $N = 1$), these were combined by fixed effects meta-analysis, as suggested by Borenstein, Hedges, Higgins, and Rothstein (2009).

Q and I^2 were used to analyse homogeneity in the distribution of effect sizes. Q assesses the variation in effect sizes between studies; a significant Q value indicates heterogeneity. I^2 indicates the proportion of this variance which reflects genuine

[1] Searches in PubMed and ERIC were initially carried out by the first author, followed by two additional independent searches by research assistants. Searches in PsycInfo, conducted in September 2013, for studies published up to and including the year 2012, were also carried out by the first author, followed by an independent search by a research assistant. Consistency in identification of studies which met the inclusion criteria (see Fig. 1 and inclusion criteria below) was 75%.

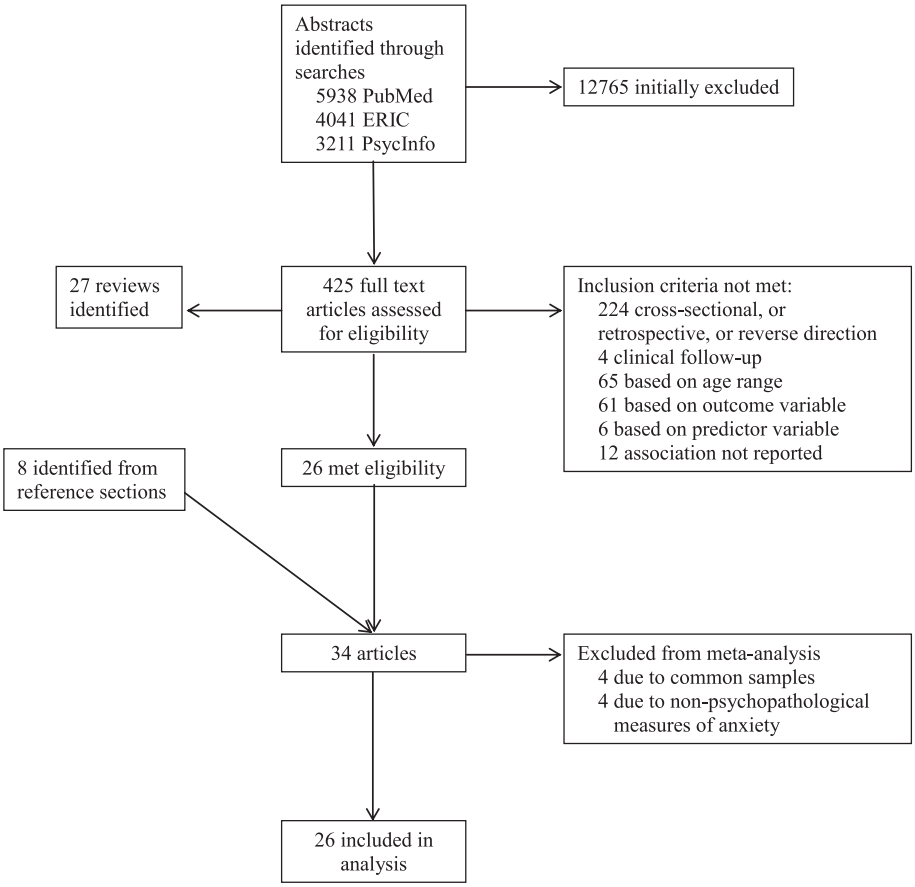

Fig. 1. Flowchart illustrating the search and exclusion process.

heterogeneity in the effect sizes, as opposed to within-study variance. Values of 25%, 50% and 75% have been suggested to be low, moderate and high, respectively (Higgins, Thompson, Deeks, & Altman, 2003).

Three assessments were used to identify possible publication bias, which occurs because studies with significant results are more likely to be published (e.g. Dickersin & Min, 1993). First, the Egger test of funnel plot asymmetry (Sterne & Egger, 2005) which calculates 'small study effects' bias, based on the premise that larger sample sizes should show increased precision in estimating effect size. This test therefore checks whether effect sizes differ by sample sizes. Where this was significant, the trim and fill procedure was used (Duval & Tweedie, 2000). This estimates the number of studies missing from analysis based on funnel plots and calculates a new effect size with the inclusion of these in the analysis. Where significant effect sizes were found, the Rosenthal (1979) fail-safe number was calculated to test for file-drawer effects. This estimates the number of unpublished studies omitted from the analysis which, if included, would produce a non-significant effect size and is compared to a critical number. Publication bias is indicated when the fail-safe number does not exceed the critical value. All analyses were conducted in Mix 2.0 (Bax, 2011) unless otherwise stated.

Moderator analyses

The effect of age, gender, country and measurement were investigated using subgroup analysis. For age, studies were grouped into three age groups: childhood (elementary school; age 8–12 years), early adolescence (junior high; 12–15 years) and late adolescence (senior high; 15–18 years). Where sample ages crossed groups, the mean/median age was used to classify the sample's age group. Gender-specific analyses were run using studies where effect sizes were available separately for boys and girls. Differences in sub-group effect sizes were calculated using a *Z*-test (see Borenstein et al., 2009). For age, childhood and late adolescent subgroups were compared to early adolescent subgroups.

The effect of follow-up period on the strength of association between emotional problems and school outcomes was investigated by maximum likelihood random effects meta-regression using macros in SPSS (Lipsey & Wilson, 2001; Wilson, 2005). β describes this effect size. For the school failure analyses, positive and negative βs would indicate a stronger association for longer and shorter follow-up periods respectively. For *lower* school grades, these would indicate stronger association for shorter and longer follow-up periods respectively. *Z* is presented as a significance test of the slope.

Results

In total, twenty-six studies were included in the meta-analysis (see Fig. 1 for details). An overview of the studies is presented in Table 1. Ten studies measured school failure, fifteen measured school grades, and one measured both. Eighteen of the twenty-six studies were North American. Five studies included predominantly children, eleven early adolescents, nine late adolescents and one included both children and early adolescents. Follow-up periods ranged from 4 months to 120 months with a median of 30 months. Fifteen effect sizes were available for school failure: nine for depression, two for internalising problems and four for anxiety. Twenty effect sizes were available for school grades: eight for depression, six for

Table 1
Overview of characteristics of included studies.

Study	School outcome	Emotional problem	*n*	Country	% Male	Age range at start	Mean follow-up (months)	Emotional problems measure	Effect size (*r*)
Ansary et al. (2012)	Grades	Anxiety	595	USA	50	11–12[i]	24	CMAS-R	0.08
	Grades	Depression	595	USA	50	11–12[i]	24	CDI	0.04
Birchwood and Daley (2012)	Grades	Anxiety	324	UK	48	15–16[k]	6	HADS	−0.18
	Grades	Depression	324	UK	48	15–16[k]	6	HADS	−0.31
Capaldi and Stoolmiller (1999)	Failure	Depression	201	USA	100	11–14[j]	60	CEDS	0.29
Chalita et al. (2012)	Failure	Anxiety	237	Mexico	38	12–15[j]	12	SCARED[a]	0.10
	Failure	Depression	237	Mexico	38	12–15[j]	12	DSRS[a]	0.39
Chen et al. (2003)	Grades	Internalising	147	China	55	11–12[j]	24	CBCL	−0.07
Fergusson and Woodward (2002)	Failure	Depression	964	NZ	49	15–16[k]	60	DIS[a]	0.13
Flook, Repetti, and Ullman (2005)	Grades	Internalising	188	USA	50	10–11[i]	12	TRF	−0.30
Fredricks and Eccles (2008)	Grades	Depression	903	USA	49	12–13[j]	48	CDI[b]	−0.05
Fredricks and Eccles (2010)	Grades	Internalising	727	USA	49	13–14[j]	36	CBCL	−0.08
Giaconia, Reinherz, Paradis, Hauf, and Stashwick (2001)	Failure	Depression	344	USA	50	18[k]	36	DIS[#]	0.19
Gore, Farrell, and Gordon (2001)	Grades	Depression	1036	USA	42	14–17[k]	72	HIMHB	−0.10
Janosz et al. (2008)	Grades	Internalising	1104	Canada	52	11–15[j]	12	BAI, IDD	−0.06
Kandel and Davies (1986)	Failure	Depression	924	USA	45	15–17[k]	108	[c,a]	0.11
Laursen, Pulkkinen, and Adams (2002)	Grades	Anxiety	181	Finland	53	8[i]	72	[d]	−0.19
Luthar (1995)	Grades	Anxiety	138	USA	45	14–16[j]	6	CMAS-R	0.11
	Grades	Depression	138	USA	45	14–16[j]	6	CDI	−0.04
	Grades	Internalising	138	USA	45	14–16[j]	6	YSR	0.10
McLeod and Kaiser (2004)	Failure	Depression	424	USA	n/a	14–16[j]	72	CEDS	0.03
	Failure	Internalising	424	USA	n/a	10–12[i]	120	CBCL[e]	0.18
Miech, Caspi, Moffitt, Wright, and Silva (1999)	Failure	Anxiety	942	NZ	52	15[j]	72	DISC-C[a]	0.02
	Failure	Depression	942	NZ	52	15[j]	72	DISC-C[a]	0.08
Morin (2011)	Failure	Anxiety	989	Canada	n/a	12–13[j]	68	BAI	0.09
	Grades	Anxiety	592	Canada	n/a	12–13[j]	56	BAI	0.06
Needham, Crosnoe, and Muller (2004)	Grades	Depression	10,988	USA	53	12–17[k]	12	CEDS	−0.15
Owens, Shippee, and Hensel (2008)	Grades	Depression	894	USA	46	14–15[j]	60	CDI	−0.08
Schwartz, Gorman, Nakamoto, and Toblin (2005)	Grades	Depression	199	USA	63	8–10[i]	12	CDI	−0.32
Sharma (1970)	Grades	Anxiety	700	India	52	15–17[k]	4	[f]	−0.05
Smokowski, Mann, Reynolds, and Fraser (2004)	Failure	Depression	801	USA	50	16[k]	72	[g]	0.11
Suldo, Thalji, and Ferron (2011)	Grades	Internalising	300	USA	37	11–14[j]	12	YSR	−0.16
van Oort et al. (2007)	Failure	Internalising	654	NL	49	11–15[j]	120	YSR	0.18
Vander Stoep, Weiss, McKnight, Beresford, and Cohen (2002)	Failure	Anxiety	174	USA	51	13–17[k]	30	DIS[h,a]	0.43
	Failure	Depression	174	USA	51	13–17[k]	30	DIS[h,a]	0.35

Note: Internalising = internalising problems; Failure = school failure; Grades = school grades; n/a = not available; NL = The Netherlands; NZ = New Zealand; BAI = Becks Anxiety Inventory; CBCL = Child Behaviour Checklist; CDI = Children's Depressive Inventory; CEDS = Centre for Epidemiological Studies Depression Scale; CMAS-R = Revised Children's Manifest Anxiety Scale; DIS = Diagnostic Interview Schedule; DISC-C = Diagnostic Interview Schedule for Children; DSRS = Depression Self Rating Scale; HADS = The Hospital Anxiety & Depression Scale; HIMHB = Health Insurance Mental Health Battery scale; IDD = Inventory to Diagnose Depression severity score; SCARED = The Screen for Child Anxiety Related Emotional Disorders; TRF = Teacher Report Form; YSR = Youth Self-Report.

[a] Reduced version.
[b] Based on stated scale.
[c] Symptom endorsement.
[d] A 6 item scale.
[e] Three items rated by teachers and peers.
[f] An anxiety scale in Hindi.
[g] 3 items from a student survey.
[h] Dichotomous.
[i] Coded as childhood.
[j] Coded as early adolescence.
[k] Coded as late adolescence.

Table 2
Effect sizes for school failure and school grades.

	k (USA[b])	Main effects				Evidence from main effects		Evidence of moderation[a]		
		n	Effect size (r)	Q	I^2	Heterogeneity[c]	Publication bias[d]	Age	Gender	Follow-up period
School failure										
Depression	9 (6)	5011	.17***	41.66***	80.80	Yes	No[e]	No	No	Yes
Internalising	2 (1)	1078	.18***	<.001	<.001	No[f]	No	[g]	[g]	[g]
Anxiety	4 (1)	2342	.15*	28.65***	89.53	Yes	No	[g]	Yes	No
School grades										
Depression	8 (7)	15077	−.12***	52.01***	86.54	Yes	No	Yes[h]	No	No
Internalising	6 (4)	2604	−.10*	16.78**	70.20	Yes	No	No	No	No
Anxiety	6 (2)	2530	−.03	25.67***	80.52	Yes	No	Yes[h]	No	No

Note: *$p < .05$, **$p < .01$, ***$p < .00$. k = number of studies.
[a] Based on moderator analyses details in Tables 3–5.
[b] Number of USA studies.
[c] Indicated by significant Q and large I^2.
[d] Indicated by Rosenthal's failsafe number and the Egger test.
[e] Significant Egger test but trim and fill analysis estimated that no studies were missing from the analysis.
[f] Indicated by Rosenthal's failsafe number only as insufficient data to perform the Egger test.
[g] Insufficient data.
[h] Significant different between early adolescence and late adolescence.

internalising problems and six for anxiety. Sample sizes for these individual effect sizes ranged from 138 to 10,988 with a median of 424. In total, participant sample size was 24,353.

Results of the six meta-analyses are presented in Table 2, illustrating the number of studies, participants and effect sizes. It also provides information on heterogeneity, publication bias and moderation which are described in more detail below.

School failure

Depression

Nine studies ($n = 5011$) were included in the meta-analysis of depression and school failure (Table 2). The overall effect size was heterogeneous ($Q = 41.66$, $p < .001$). Depression was associated with school failure, with an effect size of $r = .17$ ($p < .001$). There was no evidence of publication bias according to Rosenthal's failsafe number (fail-safe number = 801, critical value = 55). The Egger test showed a significant risk publication bias (intercept = 5.49, $t = 3.28$, $p < .05$), although a trim and fill analysis estimated that no studies were missing from the analysis. There were no studies examining childhood; subgroup analysis compared early and late adolescence found no difference in effect sizes ($Z = -.41$, $p > .05$; $r = .19$ and $r = .16$ respectively) (Table 3). Gender-specific analyses found no difference in effect sizes for boys and girls ($Z = 1.58$, $p > .05$; $r = .03$ and $r = .19$ respectively) (Table 4). There was a stronger association between depression and school failure for shorter compared to longer follow-up periods ($\beta = -.75$, $p < .01$) (Table 5).

Internalising problems

Two studies ($n = 1078$) were included in the meta-analysis of internalising problems and school failure (Table 2). The overall effect size was not heterogeneous ($Q = <.001$, $p > .05$). Internalising problems were associated with school failure, yielding a meta-analysis effect size of $r = .18$ ($p < .001$). There was no evidence of publication bias according to Rosenthal's failsafe number (fail-safe number = 51, critical value = 20). The Egger test and moderator analyses could not be calculated as there were too few studies.

Table 3
Results of age subgroup analyses.

	Childhood (8–12 years)				Early adolescence (12–15 years)				Late adolescence (15–18 years)				Comparisons to early adolescence	
	k	r	Q	I^2	k	r	Q	I^2	k	r	Q	I^2	Z childhood	Z late adolescence
School failure														
Depression	[a]	[a]	[a]	[a]	4	.19*	29.99***	90.00	5	.16***	11.66*	65.70	[a]	−.41
School grades														
Depression	2	−.14	20.80***	95.19	3	−.06***	.55	<.01	3	−.17***	11.38***	82.42	.39	−2.37*
Internalising	2	−.19	4.81*	79.22	4	−.07†	6.58†	54.41	[a]	[a]	[a]	[a]	.02	[a]
Anxiety	2	−.05	10.10**	90.10	2	.07†	.34	<.01	2	−.11†	3.83†	73.86	.81	−2.31*

Note: †$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$. k = number of studies.
[a] Insufficient data.

Table 4
Results of gender subgroup analyses.

	Boys				Girls				Comparison
	k	*r*	*Q*	I^2	*k*	*r*	*Q*	I^2	*Z*
School failure									
Depression	6	.03	38.80***	87.11	6	.19*	61.94***	91.93	1.58
Anxiety	3	−.03	1.39	<.01	3	.20***	.049	<.01	5.23***
School grades									
Depression	6	−.06	61.97***	91.93	6	−.10	167.61***	97.02	−.25
Internalising	4	−.08	9.13*	67.13	4	−.19***	9.92*	69.77	−1.42
Anxiety	3	−.06	3.75	46.62	3	−.10†	4.73†	57.72	−.54

Note: †$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$. *k* = number of studies.

Anxiety

Four studies ($n = 2342$) were included in the meta-analysis of anxiety and school failure (Table 2). The overall effect size was heterogeneous ($Q = 28.65$, $p < .001$). Anxiety was associated with school failure, with an effect size of $r = .15$ ($p < .05$). There was no evidence of publication bias according to the Egger test (intercept = 5.82, $t = 1.67$, $p > .05$) or Rosenthal's failsafe number (fail-safe number = 113, critical value = 30). Insufficient data were available for subgroup analysis for age. Gender-specific analyses found larger effect sizes in girls than boys ($Z = 5.23$, $p < .001$; $r = .20$ and $r = -.03$ respectively) (Table 4). Meta-regression results revealed no effect of follow-up period on the association between anxiety and school failure ($\beta = -.47$, $p > .05$) (Table 5).

School grades

Depression

Eight studies ($n = 15{,}077$) were included in the meta-analysis of depression and school grades (Table 2). The overall effect size was heterogeneous ($Q = 52.01$, $p < .001$). The meta-analysis produced an effect size of $r = -.12$ ($p < .001$). Depression was associated with lower school grades. There was no evidence of publication bias according to the Egger test (intercept = .87, $t = .55$, $p > .05$) or Rosenthal's failsafe number (fail-safe number = 318, critical value = 50). Subgroup analysis found effect sizes in early adolescence to be smaller than in late adolescence ($Z = -2.37$, $p < .05$; $r = -.17$ and $r = -.06$ respectively) but no different from childhood ($Z = .39$, $p > .05$; childhood $r = -.14$) (Table 3). Gender-specific analyses found no difference in effect sizes for boys and girls ($Z = -.25$, $p > .05$; $r = -.06$ and $r = -.10$ respectively) (Table 4). Meta-regression results revealed no effect of follow-up period on the association between anxiety and school grades ($\beta = .39$, $p > .05$) (Table 5).

Internalising problems

Six studies ($n = 2604$) were included in the meta-analysis of internalising problems and school grades (Table 2). The overall effect size was heterogeneous ($Q = 16.78$, $p < .001$). Internalising problems were associated with lower school grades, yielding an effect size of $r = -.10$ ($p < .05$). There was no evidence of publication bias according to the Egger test (intercept = −.90 $t = -.43$, $p > .05$) or Rosenthal's failsafe number (fail-safe number = 73, critical value = 25). Subgroup analysis found no difference in effect sizes for childhood and early adolescence samples ($Z = .02$, $p > .05$; $r = -.19$ and $r = -.07$ respectively); there were no studies in late adolescence (Table 3). Gender-specific analyses found no difference in effect sizes for boys and girls ($Z = -1.42$, $p > .05$; $r = -.08$ and $r = -.19$ respectively) (Table 4). Meta-regression results revealed no effect of follow-up period on the association between anxiety and school failure ($\beta = -.01$, $p > .05$) (Table 5).

Anxiety

Six studies ($n = 2530$) were included in the meta-analysis of anxiety and school grades (Table 2). The overall effect size was heterogeneous ($Q = 25.67$, $p < .001$). Anxiety was not associated with lower school grades ($r = -.03$, $p > .05$). There was no evidence of publication bias according to the Egger test (intercept = −2.22. $t = -.63$, $p > .05$). Subgroup analysis found effect sizes in early adolescence to be smaller than in late adolescence ($Z = -2.31$, $p < .05$; $r = -.11$ and $r = .07$ respectively), but not different from childhood ($Z = .81$, $p > .05$; childhood $r = -.05$) (Table 3). Gender-specific analyses found no difference in effect sizes for boys and girls ($Z = -.54$, $p > .05$; $r = -.06$ and $r = -.10$ respectively) (Table 4). Meta-regression results revealed no effect of follow-up period on the association between anxiety and school failure ($\beta = -.12$, $p > .05$) (Table 5).

Country and diagnosis

Subgroup analyses comparing USA studies to other countries were only possible for three of the possible six comparisons due to insufficient data. Effect sizes did not vary for depression and school failure ($Z = .29$, $p > .05$) or for internalising problems and school grades ($Z = -.76$, $p > .05$). For anxiety and school grades, subgroup analyses revealed a difference in direction of effect size between USA and non-USA samples ($Z = 2.46$, $p < .05$; $r = .08$ and $r = -.08$ respectively), indicating an association between anxiety and better school grades in USA samples and worse school grades in non-USA studies.

Table 5
Results of follow-up period analyses.

	k	*β*	*Z*	*Q*
School failure				
Depression	9	−.75	−3.43**	21.10**
Anxiety	4	−.47	−1.13	5.76
School grades				
Depression	8	.39	1.26	10.31
Internalising	6	−.01	−.01	7.19
Anxiety	6	−.12	−.31	6.27

Note: $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. k = number of studies.

Subgroup analyses comparing studies using a clinical diagnosis of emotional problem compared to others were only possible for one of the possible six comparisons due to insufficient studies using clinical diagnoses. For depression and school failure, effect sizes did not differ ($Z = -1.32$, $p > .05$). Further details of findings are available from the first author.

Summary

There were small but significant effect sizes for all associations between emotional problems and school attainment (r range ±.10 to ±.18) with the exception of anxiety and school grades ($r = -.03$). There was significant heterogeneity between studies (Q range 16.78–52.01) which appears to be attributable to genuine differences between studies rather than within-study variance (I^2 range 70.20–89.53). The exception to this is for internalising problems and school failure where there was not significant heterogeneity (Q and I^2 <.001), which is probably due to the small number of studies (2). Moderator analyses indicated that some of this heterogeneity may be due to age and gender, with reduced heterogeneity particularly notable for school grades during early adolescence and for anxiety by gender. Subgroup analyses revealed that associations between emotional problems and school grades were stronger in late than early adolescence, with no significant difference between early adolescence and childhood. For school failure, comparisons were limited to early and late adolescence for depression, for which effect sizes did not differ. Gender-specific analyses indicated larger effect sizes for girls than boys, although this was only significant for association between anxiety and school failure.

Discussion

The current study provides evidence of relationships between emotional problems and subsequent school attainment. Small but significant associations were found between depression, internalising problems, anxiety and school failure. For lower school grades, associations were found with higher depression and internalising problems. An association between lower school grades and anxiety was only found when investigating moderators, specifically, age and country. This is consistent with the suggestion that in some instances anxiety can have positive functions (Lucey & Reay, 2000), and highlights the importance of investigating effects of depression and anxiety separately and examining potential moderators. However, the evidence base is more robust for depression than anxiety with a greater number of studies and participants (17 studies, 20,064 participants versus 9 studies, 4142 participants, respectively). Therefore conclusions regarding the association between anxiety and school attainment should be considered more speculative than those relating to depression. The moderators, age, gender, follow-up period and country, are discussed separately below.

Age

The majority of subgroup analyses by age were not significant and for many there were insufficient data to analyse, particularly for childhood data. However, analyses did indicate that depression and anxiety are more detrimental to school grades in later adolescence compared to early adolescence. One possible explanation is that a sub-sample of older adolescents may have had depressive and anxious symptoms for a prolonged period of time, which is consistent with the considerable homotypic continuity found for depressive disorders (Moffitt et al., 2007; Rutter et al., 2006). Further, greater impairment in late adolescence may result from more severe symptoms being endorsed or from academic work being more demanding at this age.

Gender

Gender-specific analyses indicated larger effect sizes for girls than boys, although this was only significant for one of five comparisons, which indicated that anxiety was more strongly associated with school grades for girls than boys. One possible reason for gender differences may be differing trajectories of emotional problems across childhood and adolescence, with girls tending to show a greater increase in symptoms of anxiety across this period compared to boys (Hale, Raaijmakers, Muris, van Hoof, & Meeus, 2008; Hankin, 2009). Associations between baseline emotional problems and subsequent

school attainment may therefore be intensified for girls relative to boys, due to an increase in symptoms over follow-up period. Further, homotypic and heterotypic continuity of anxiety is stronger for girls than boys (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003) thus greater impairment may result from more prolonged symptoms in girls. Gender differences were not found for associations between depression and school attainment, this may reflect the fact that although prevalence of depression is greater in girls, some clinical observations suggest worse functional outcomes for boys with depression (Diamantopoulou, Verhulst, & van der Ende, 2011; Dunn & Goodyer, 2006).

Follow-up period

Meta-regression analyses found a significant moderation by follow-up period for one of five comparisons, with associations between depression and school failure (but not grades) stronger for shorter follow-up periods. Although it has been suggested that emotional problems may only have an influence on academic outcomes in the short-term (Masten et al., 2005), our results are not consistent with this interpretation since no moderation was observed for school grades. Instead, it seems likely that this may be due to the fact that studies of school failure included longer follow-up periods (12–108 months) than those for school grades (6–72 months). Depression may influence later school grades and school failure via different pathways. For example, predicting poor school grades through short-term reductions in concentration, and school failure through absences due to poor motivation. Follow-up period did not moderate the associations between anxiety and school attainment, although range was limited (12–72 months and 4–72 months respectively). Possible pathways to school failure for anxiety also include absences, for example due to school phobia (Bernstein & Garfinkel, 1986). No moderation effect was found for internalising problems and school grades, although this is likely due to the limited range of follow-up periods (ranging 6–36 months). This could not be tested for school failure (both studies had the same follow-up period).

Country

Analyses comparing USA studies to non-USA studies found no differences for depression or internalising problems. However, there was some indication that anxiety was associated with better school grades in samples from the USA, and worse grades outside of the USA. This suggests that the school system and classroom environment in the USA may be better academically suited for pupils with anxiety, perhaps fostering the potential associations between anxiety and motivation (Eysenck, 1982; Lucey & Reay, 2000; Tallis & Eysenck, 1994). When looking at individual study effect sizes, two USA studies and one Canadian study showed an association between anxiety and better school grades (one significantly so), while studies conducted in the UK, Finland and India show associations between anxiety and lower school grades (two significantly so). This suggests that the distinction in findings for anxiety may vary between North America and Europe and Asia. One possible reason for differences between countries is school climate, which has been associated with pupil attainment (Battistich, Schaps, & Wilson, 2004; Thomas, Sammons, Mortimore, & Smees, 1997). For example, international research has shown the USA to have one of the highest student ratings of teachers supportiveness for individual learning (OECD, 2004), which may help to create a more positive learning environment for anxious pupils.

Limitations and further research

There are a number of limitations of this meta-analysis which merit discussion. Firstly, results are limited by the studies included in the analysis, particularly with regard to the moderator analyses. For age, a limited number of studies meant that only eleven of the possible eighteen sub-group analyses could be conducted. For example, there were no studies of associations between depression or anxiety and school failure during childhood and no studies of internalising problems with either outcome in late adolescence. Studies which use multiple waves of assessment across childhood and adolescence are required for clarification of the developmental patterns of the associations between emotional problems and school attainment, and possible gender differences in these. Secondly, the generalisability of findings is limited by the large proportion (73%) of included studies being based in North America. Studies based in other countries with different educational systems are needed to see whether this pattern of results is confirmed, particularly given the different findings observed for anxiety and school grades when comparing USA to non-USA studies. Community studies using clinical diagnoses of emotional problems are also encouraged given that there were too few to adequately test whether this effected associations.

Thirdly, prior school attainment was not controlled for in the meta-analyses as only 10 of the 26 studies included associations controlling for a baseline measure of school attainment, and these measures were too varied to allow meta-analysis. While the analyses provide evidence for a longitudinal association between emotional problems and subsequent school attainment, this does not necessarily suggest that changes in emotional problems lead to changes in school attainment. The possibility cannot be ruled out that these longitudinal associations are a combination of cross-sectional associations and high stability in emotional problems and school attainment. Nevertheless, these findings do show that emotional problems are associated with poor school attainment later in life, and therefore highlight the importance of identifying pupils with emotional problems in order to interrupt a developmental sequence where emotional problems may result in other difficulties (Petrides, Frederickson, & Furnham, 2004). Other potential confounders such as childhood socioeconomic status and potentially important co-occurring problems such as behavioural problems were also not addressed, due to the limited number of studies that controlled for such factors. It is possible that covariance between emotional problems and such factors

could influence the association between emotional problems and subsequent school attainment (e.g. Riglin, Frederickson, Shelton, & Rice, 2013).

Finally, it is beyond the scope of this meta-analysis to provide evidence for the possible pathways through which emotional problems may lead to low school attainment. Now that this association has been established, important future directions include examining potential moderator and mediator variables. Candidates include impaired concentration, reduced motivation and school connectedness, all of which are considered important elements of successful learning and achievement at school (Maddox & Prinz, 2003; Rupani, Haughey, & Cooper, 2012; Ryan & Powelson, 1991), as well as school level effects, such as school climate, school size and socio-economic makeup (Thomas et al., 1997). Future studies should use a prospective longitudinal design and test putative hypothesis-driven pathways linking emotional problems to subsequent school attainment. A better understanding of these pathways may aid the development of effective school-based intervention programmes aimed at improving emotional and academic outcomes.

Conclusion

In conclusion, emotional problems were found to be associated with later poor school attainment. Findings were more consistent for depression than anxiety. Associations with school grades were stronger in late adolescence than early adolescence and associations between anxiety and school failure were stronger in girls. There was some indication that associations may also differ by country for anxiety and by follow-up period for depression. The findings highlight the need to identify pupils with emotional problems early and to provide assistance aimed at improving school attainment as well as mental health. Longitudinal research spanning childhood to adolescence, using multiple measures and multiple time-points, is needed for a clearer understanding of the impact of emotional problems on school outcomes. Further, investigation into possible pathways between emotional problems and school attainment would help to better understand these associations.

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